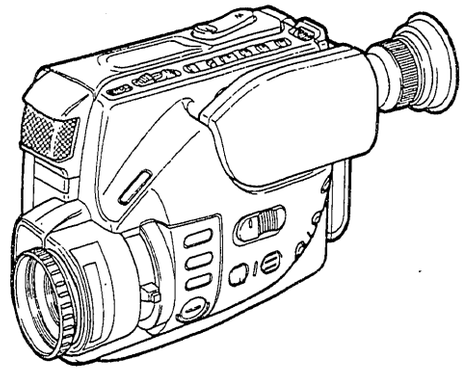
HITACHI

SERVICE MANUAL

TK | **No.3552E**

VM-E23A(U,C),(PX)



Technical Data

MANUAL RELATED TO THE VM-E23A

TITLE	MODEL	MANUAL No.
Technical Information	VM-E23A	No. 3554E
RF UNIT	VM-RF85A	No. —
POWER ADAPTER /CHARGER	VM-AC80A	No. 3311E

SPECIFICATIONS

■ General	
Power requirements	6V DC
Power consumption	6 watts (When "FULL AUTO" switch is set to "MAN" and "FOCUS M" is displayed in the viewfinder.)
Dimensions	4-7/16"(W) x 4-1/2"(H) x 6-7/8"(D) 112(W) x 114(H) x 174(D) mm
Weight	1.8 lbs (810 g)
Operating temperature	32°F ~ 104°F
Storage temperature	−4°F ~ 140°F
■ Video Recorder Section	
Format	8mm
Record/playback system	Two video record/playback heads
Video signal	EIA standard NTSC color
Tape speed	14.3 mm/sec.
Video input	1.0 Vp-p, 75 ohm
Video output	1.0 Vp-p, 75 ohm
Audio input	−7.8 dBs (316 m Vrms)
Audio output	−7.8 dBs (316 m Vrms)
Fast forward/rewind time	Less than 8 minutes with P6-120 cassette
■ Camera Section	
Scanning	525 lines/60 fields/30 frames
Required minimum illumination	3 lux
Pickup device	1/3" C.C.D
Lens diameter	34 mm

8

SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine Hitachi replacement parts. Especially critical parts in the power circuit block should not be replaced with other makers'. Critical parts are marked with ⚠ in the schematic diagram.
2. Before returning a repaired unit to the customer, the service technician must thoroughly test the unit to ascertain that it is completely safety operate without danger of electrical shock.

X-RAY RADIATION

The primary source or X-ray radiation in this viewfinder is the picture tube. The tube used in this view-finder is especially constructed to limit X-ray radiation emission. For continued X-ray radiation protection, the replacement tube must be the same type as the original, Hitachi approved one.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

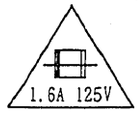
8mm VIDEO CAMERA/RECORDER

October 1991 TOKAI WORKS

CAUTION AGAINST FUSE REPLACEMENT MARKING /
MESURE DE PRÉCAUTION À PRENDRE À PROPOS DES MARQUES DE FUSIBLE / :

CAUTION : FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH SAME TYPE AND SAME RATING FUSE IN ACCORDANCE WITH THE FUSE SYMBOL MARKING.
MESURE DE PRÉCAUTION : POUR ASSURER À L'APPAREIL UNE PROTECTION PERMANENTE CONTRE TOUT RISQUE D'AMORÇAGE ÉLECTRIQUE, REMPLACER UNIQUEMENT PAR UN FUSIBLE DE MÊME TYPE ET DE MÊME CATÉGORIE CONFORMÉMENT AUX MARQUES INDIQUÉES SUR LE FUSIBLE.

* Example / * Exemple



This symbol indicates Fast Operating Type 1.6A, 125V Fuse.
Ce symbole se rapporte à un fusible à fusion rapide de type 1,6A, 125V

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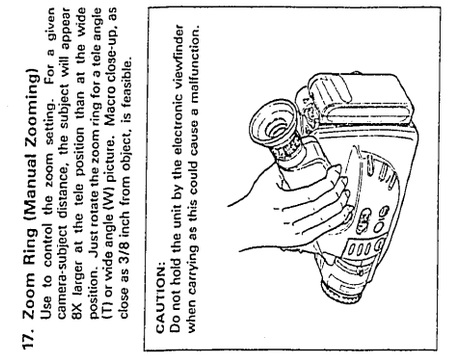
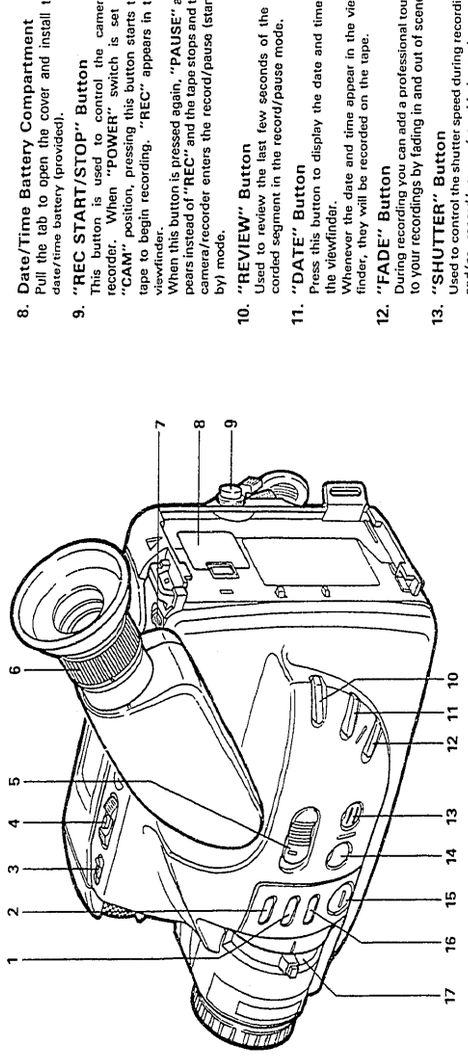
CHAPTER 1 IDENTIFICATION AND OPERATION OF CONTROLS

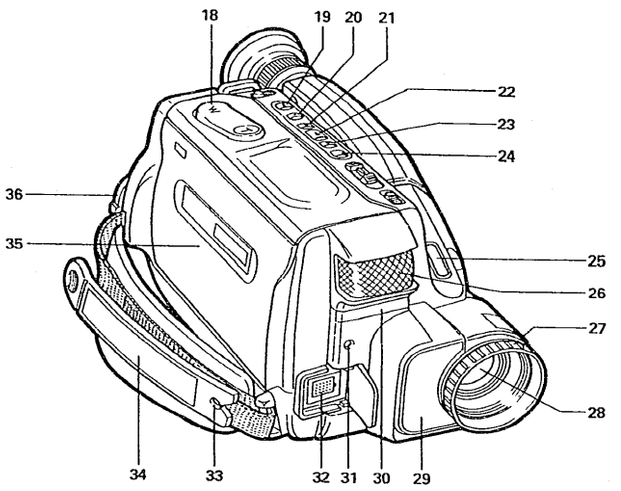


17. Zoom Ring (Manual Zooming)
Use to control the zoom setting. For a given camera-subject distance, the subject will appear 8X larger at the tele position than at the wide position. Just rotate the zoom ring for a tele angle (T) or wide angle (W) picture. Macro close-up, as close as 3/8 inch from object, is feasible.

CAUTION:
Do not hold the unit by the electronic viewfinder when carrying as this could cause a malfunction.



1. **"RESET" Button**
When the linear time counter is displayed in the viewfinder, pressing this button resets the counter to "0:00:00".
2. **"DISPLAY" Button**
When this button is pressed, the display in the viewfinder will change in sequence.
3. **"EJECT" Switch**
Operates with "POWER" either on or off, if a power source is connected to the camera/recorder.
4. **"POWER" Switch**
This turns the camera/recorder on and off and also switches between the camera and VCR modes. Set the switch to "CAM" to turn the camera's power on and to "VCR" to turn the VCR's power. Press and hold the small red button in the switch to switch it.
5. **"FULL AUTO" Switch**
When this switch is set to "AUTO", the focus, shutter speed and iris are adjusted automatically. To adjust these functions manually, set this switch to "MAN" and adjust the corresponding buttons and switches.
6. **Diopter Control**
To use the electronic viewfinder without eyeglasses on, turn this control ring for your optimum focus adjustment.
7. **"BATTERY" Release Lever**
Releases the battery, AC adapter/charger or battery case attached to the camera/recorder.
8. **Date/Time Battery Compartment**
Pull the tab to open the cover and install the date/time battery (provided).
9. **"REC START/STOP" Button**
This button is used to control the camera/recorder. When "POWER" switch is set to "CAM" position, pressing this button starts the tape to begin recording. "REC" appears in the viewfinder.
When this button is pressed again, "PAUSE" appears instead of "REC" and the tape stops and the camera/recorder enters the record/pause (stand-by) mode.
10. **"REVIEW" Button**
Used to review the last few seconds of the recorded segment in the record/pause mode.
11. **"DATE" Button**
Press this button to display the date and time in the viewfinder.
Whenever the date and time appear in the viewfinder, they will be recorded on the tape.
12. **"FADE" Button**
During recording you can add a professional touch to your recordings by fading in and out of scenes.
13. **"SHUTTER" Button**
Used to control the shutter speed during recording and/or record/pause (stand-by) mode.
14. **"BACK LIGHT" Button**
When the subject is lit from behind, press and hold this button to compensate for the back-lighting.
15. **"FOCUS" Button**
Use this button to focus the subject manually. After setting "FULL AUTO" switch to "MAN", press "FOCUS" button so that "FOCUS M" appears in the viewfinder. You can use the focus ring to bring the subject into focus.
16. **"TITLE" Button**
Press this button to create and record personalized titles on your videos with the camera/recorder's built-in titler.



18. Power Zoom Switch
This switch performs zooming electrically.
"W": Picture becomes wider gradually.
"T": Picture becomes telescopic gradually.

19. "PAUSE" Button
When this button is pressed during recording, the tape stops and the camera/recorder enters the record/pause (stand-by) mode. When this button is pressed again, the tape runs to resume recording. This button may be also used to display a still picture during playback mode.

20. "STOP" Button
The "STOP" button is used to stop playback, rewind, and fast forward operations. The "STOP" button has no effect during camera record operation. Also use "STOP" button when setting the date/time.

21. "F.FWD" Button
Press this button during stop or rewind mode, and fast-forwarding starts.
Press the button during playback of tape, and the tape is played back in the forward direction approximately 9 times faster than the normal speed to confirm the recorded content.
Press "PLAY" button to return to normal playback mode or press "STOP" button to stop tape movement. Also use "F.FWD" button when setting the date/time.
NOTE: You can also visually scan forward when the camera/recorder is in record/pause (stand-by) mode by pressing and holding this button.

22. "PLAY" Button
Used for playback of tape.
NOTE: When the camera/recorder is in record/pause (stand-by) mode, pressing and holding this button will play the tape at normal speed.

23. "REW" Button
Press this button during stop or fast forward mode, and fast-rewinding starts. Press the button during playback of tape, and the tape is played back in the rewind direction approximately 7 times faster than the normal speed to confirm the recorded contents.
Press "PLAY" button to return to normal playback mode or press "STOP" button to stop tape movement. Also use "REW" button when setting the date/time.
NOTE: You can also visually scan backward when the camera/recorder is in record/pause (stand-by) mode by pressing and holding this button.

24. "REC" Button
Use this button to record pictures from an external input connected to the "AV IN/OUT" jack. This can be used as a record button only when the "POWER" switch is set to "VCR".

25. "ZOOM MODE" Button
Use this button to switch the digital zoom feature. Usually press this button so that "ZM:1" appears in the viewfinder.

26. Microphone
Sensitive to source coming from the direction in which the camera is pointed.

27. Focus Ring
Used to achieve manual focus.
Do not attempt to manually turn the focus ring when the camera/recorder is in the auto focus mode.

28. Lens
F1.8 (6.7 – 54 mm) 8:1 power zoom lens features auto focus and auto iris functions.

29. Auto Focus Window
To automatically focus the camera lens, this window transmits and receives infrared light which is reflected off the object. Make sure you don't obstruct this window when recording.

30. Infrared Ray Receiver
Receives infrared rays from the remote control (provided).

31. Record Indicator
This indicator lights up to indicate that the camera/recorder is recording.

32. "AV IN/OUT" Jack
Use the RF output adapter (Accessory No. 4) or the AV output cord (Accessory No. 1) to connect this jack to a TV to view the pictures played back by the camera/recorder.
Use the AV input cord (Optional Accessory) to connect this jack to a TV or VCR to record pictures from the VCR or TV.

33. Lens Cap Tab
Place the lens cap on this tab when you are ready to record a scene. The tab also prevents the lens cap from swinging around on its cord.

34. Hand Strap
Adjust to best fit to your hand.

35. Cassette Holder
Slide "EJECT" switch to open the cassette holder. Be aware of the cassette direction when inserting.
NOTE: Power source must be connected to open the cassette holder.

36. Power Save Lever
When the "POWER" switch is set to "CAM", this lever turns the camera's power on and off. This is convenient during camera recording because it is not necessary to set the "POWER" switch to "OFF" when you want to turn camera's power off and then on again.

CHAPTER 2
DISASSEMBLY

Note 1: Set the unit to the eject state before stating disassembly, otherwise the VCR section (the right case) cannot be removed.

Note 2: Remove the lens cap and lens hood and set the focus ring to infinity (∞) end. If the focus ring is not set to infinity (∞) end, the sensor circuit board and lens block cannot be removed.

Note 3: Prepare a 3 DC power supply when dismantling the mechanical block.

Note 4: Disconnect flat cable from connectors by the following procedure to prevent damage to connectors. Since most circuit boards in this 8mm video camera/recorder are connected via board-in type connectors, be sure to follow DISASSEMBLY when removing the circuit board.

HOW TO DISCONNECT A FLAT CABLE

① Release the lock of the connector on the left and right simultaneously.

② Pull out the flat cable

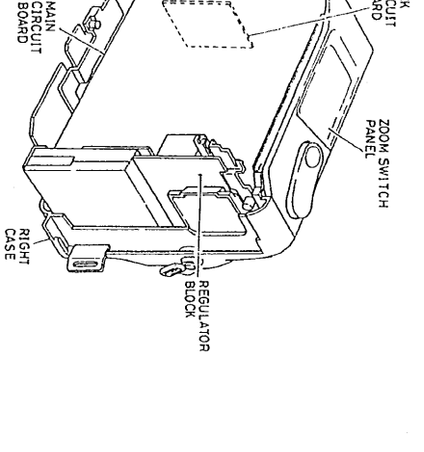


Fig. 2-2

1. IDENTIFICATIONS OF MAJOR COMPONENTS

1-1. MAJOR CIRCUIT BOARDS

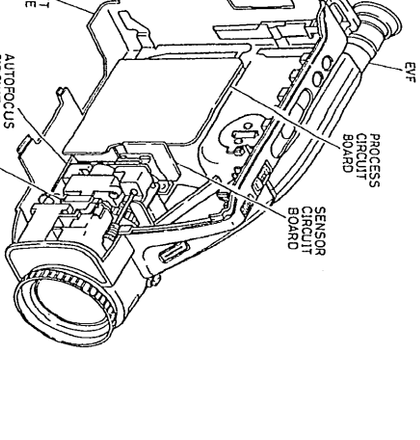


Fig. 2-1

1-2. MAJOR MECHANICAL COMPONENTS

1-2-1. Sub Chassis Assembly

1. Middle Pole
2. Take-up Guide Roller Rail
3. Take-up Guide Arm
4. Pressure Roller
5. Take-up Guide Roller Base
6. Take-up Reel Disk
7. Safety Tab/Tape Select Switch
8. Take-up Reel Brake
9. Reel Drive Idler
10. Supply Reel Disk
11. Supply Reel Brake
12. Tape Thickness Switch
13. Tension Control Arm
14. Tension Relay Arm
15. Supply Guide Roller Base (Supply Guide Roller(1))
16. Tension Arm
17. Supply Guide Roller (3)
18. Supply Guide Roller Rail

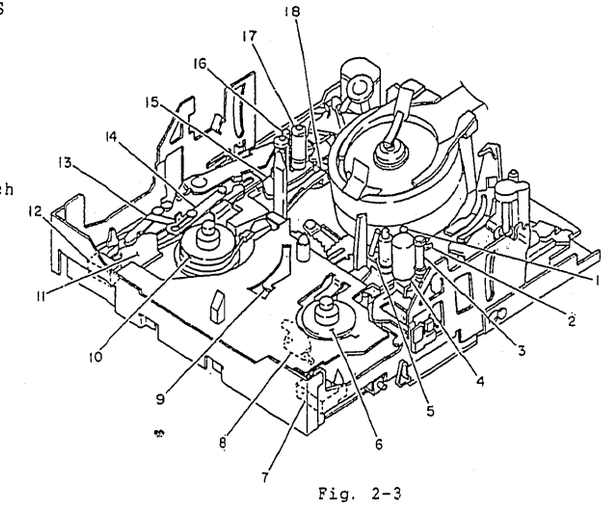


Fig. 2-3

1-2-2. Main Chassis Assembly

1. Cylinder
2. Take-up Guide Post
3. Capstan Motor
4. Center Relay Gear
5. Reel Drive Belt
6. Pressure Roller Drive Arm
7. Take-up Loading Cam Gear
8. Eject Arm
9. Cassette Holder Switch
10. Center Gear
11. Supply Cam Gear Holder
12. Sub Chassis Slide Arm
13. Supply Loading Cam Gear
14. Supply Brake Gear
15. Slide Gear
16. Mechanism State Switch
17. Loading Gear (3)
18. Loading Gear (2)
19. Loading Gear (1)
20. Loading Motor
21. Supply Guide Roller (2)
22. Cylinder Base

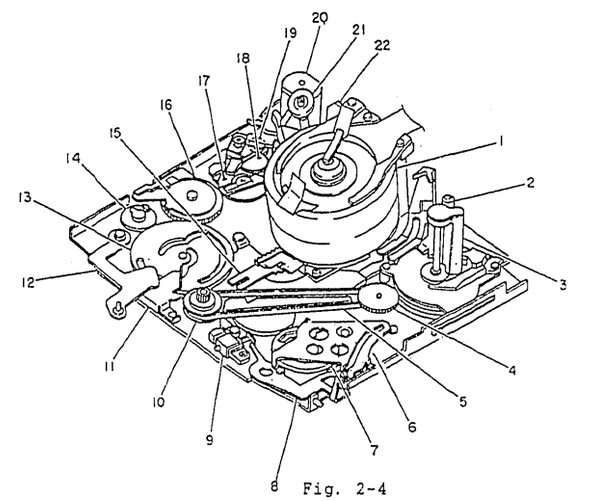


Fig. 2-4

2. DISASSEMBLY METHOD WHEN TROUBLE OCCURS

The following shows the disassembly method when unloading cannot be done normally due to a defect.
When unloading can be done normally, refer to "3. NORMAL DISASSEMBLY METHOD".

2-1. WHEN UNLOADING CANNOT BE DONE

2-1-1. To Set To The Eject State

1) Remove one (1) screw holding the microphone (MIC). (See Fig. 2-11)
2) Remove the MIC in the direction of arrow (A) and disconnect one (1) connector (CN014) on the MIC.
3) Remove five (5) screws holding the camera section and VCR section. (See Fig. 2-12)
4) Disconnect two (2) connectors (CN515, CN903) on the regulator block and process circuit board. (See Fig. 2-13)
5) Disconnect one (1) flat cable (CN1216) from the regulator block.
6) Disconnect connector CN120.

Advise 1:
If an electric circuit system defective, disconnect connector CN904 from the main circuit board and apply 3V DC to the connector (female). Unloading can now be done. (See Fig. 2-14)

If unloading still cannot be done by the above procedure, there is a defect in the mechanical block. Remove the cassette lid and right case by the following procedure an then disassemble the mechanical block.

7) Remove the DC power supply (DC3V) from CN904. (See Fig. 2-14)
8) Lift the zoom switch panel, remove the cassette lid in the direction of arrow (A). (See Fig. 2-15)
9) Remove four (4) screws holding the right case. (See Fig. 2-16)
10) Lift the zoom switch panel, remove the right case in the direction of arrow (A).

Advice 2:
If the defect is in the loading motor, remove it and then turn loading gear (1) in the direction of the arrow. Unloading can be dune manually. (See Fig. 2-17)

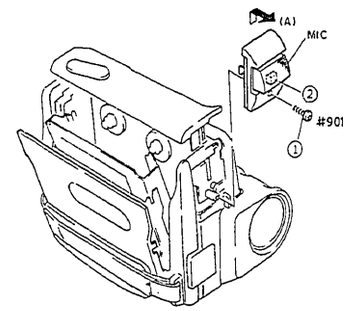


Fig. 2-11

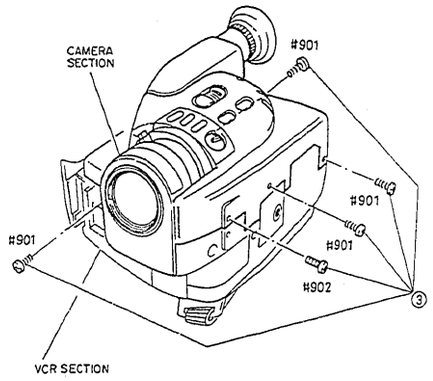


Fig. 2-12

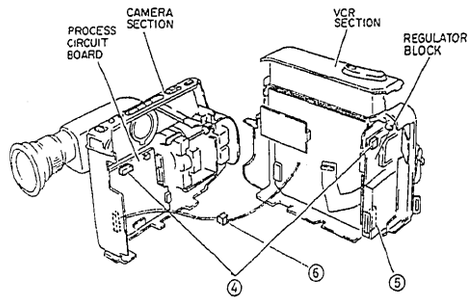


Fig. 2-13

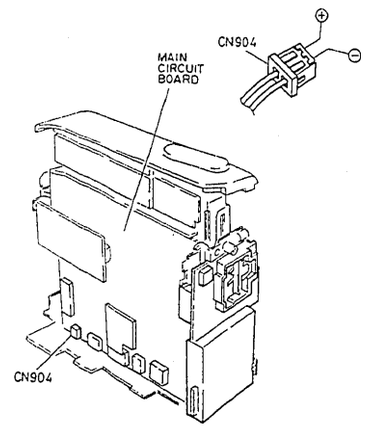


Fig. 2-14

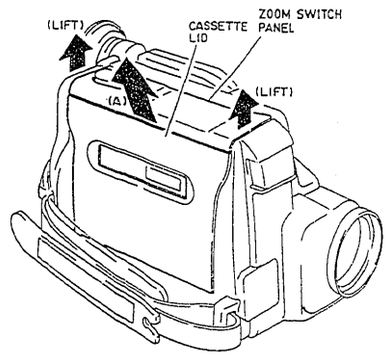


Fig. 2-15

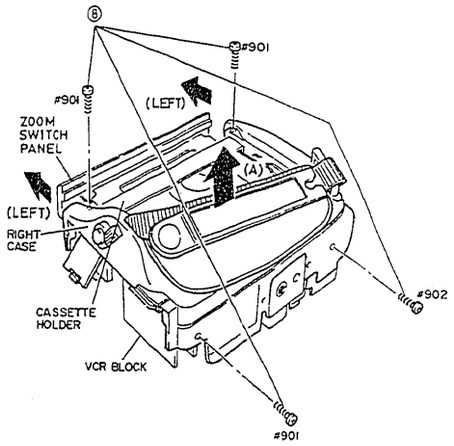


Fig. 2-16

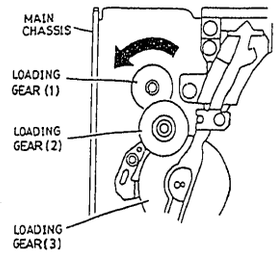


Fig. 2-17

3. NORMAL DISASSEMBLY METHOD

The following shows the disassembly method when unloading can be done normally.
If unloading cannot be dune, refer to "2. DISASSEMBLY WHEN TROUBLE OCCURS".

3-1. SEPARATING THE CAMERA AND VCR SECTIONS

3-1-1. Cassette Lid, Microphone (MIC)

(1) Cassette Lid

1) Remove the cassette lid in the direction of arrow (A). (See Fig. 2-21)

(2) Microphone (MIC)

1) Remove one (1) screw holding the MIC. (See Fig. 2-21)
2) Remove the MIC in the direction of arrow (B).
3) Disconnect connector (CN014) on the MIC.

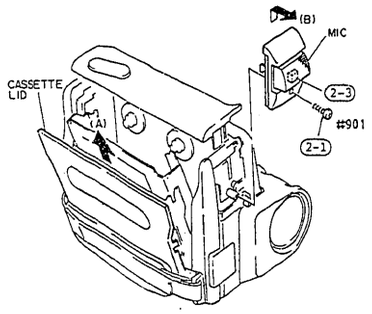


Fig. 2-21

3-1-2. Separating the Camera Section and VCR Section

ORDER FOR REMOVING PARTS	ITEM No.
- MIC	3-1-1

1) Remove five (5) screws holding the camera section and VCR section. (See Fig. 2-22)
2) Disconnect two (2) connectors (CN515, CN903) on the regulator block and process circuit board. (See Fig. 2-23)
3) Disconnect one (1) flat cable (CN1216) from the regulator block.
4) Disconnect connector CN120.

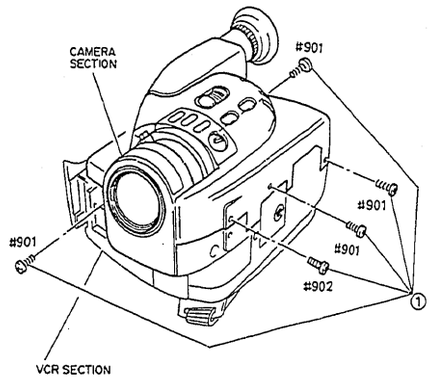


Fig. 2-22

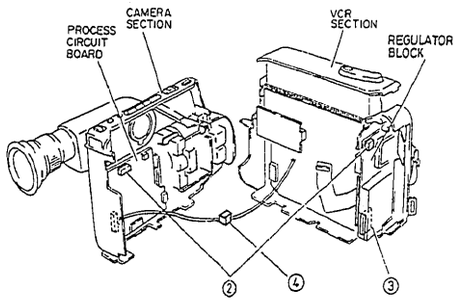


Fig. 2-23

3-2. CAMERA SECTION (LEFT CASE SIDE) REMOVAL

ORDER FOR REMOVING PARTS	ITEM No.
- MIC	3-1-1
- Separating the Camera Section and VCR Section	3-1-2

3-2-1. Electronic Viewfinder (EVF)

1) Disconnect one (1) connector (CN1209) on the process circuit board. (See Fig. 2-24)
2) Remove two (2) screws holding the EVF and EVF plates.
3) Release two (2) tabs and remove the EVF from the left case in the direction of the arrow.

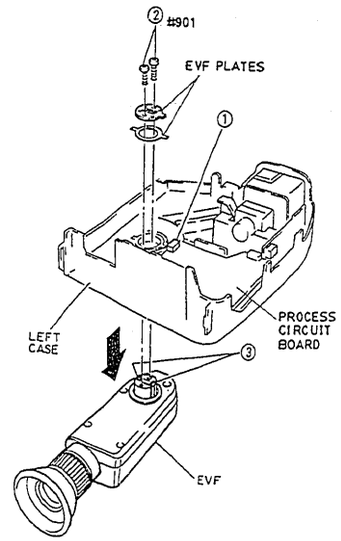


Fig. 2-24

3-2-2. Process Circuit Board, Sensor Circuit Board, Lens Block

(1) Process Circuit Board

1) Disconnect two (2) connectors (CN11208, CN1209) and one (1) flat cable (CN1207) on the process circuit board. (See Fig. 2-25)
2) Remove three (3) screws holding the process circuit board.
3) Remove the process circuit board in the direction of arrow (A) separating the from the sensor circuit board. (The process and sensor circuit boards are connected via board-in type connector.)

(2) Sensor Circuit Board, Lens Block

Note: Remove the lens cap and lens hood and set the focus ring to infinity (∞) end. If the focus ring is not set to infinity (∞) end, the sensor circuit board and lens block cannot be removed.

4) Remove three (3) screws holding the lens block. (See Fig. 2-25)
5) Remove the lens block and sensor circuit board from the left case in the direction of arrow (B).
6) Disconnect one (1) flat cable (CN1002) on the sensor circuit board.
7) Remove two (2) screws holding the sensor circuit board.

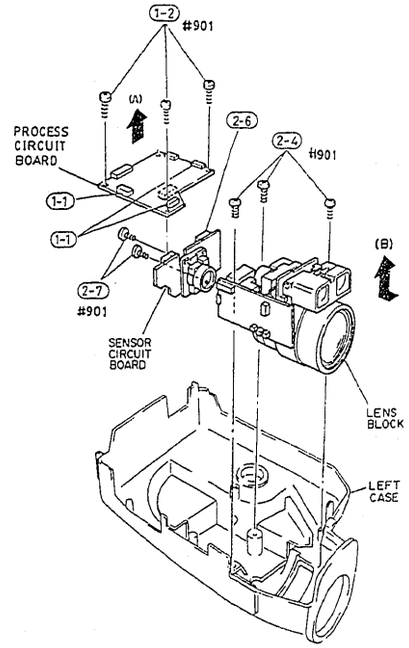


Fig. 2-25

3-2-3. Control Switch Block

ORDER FOR REMOVING PARTS	ITEM No.
- Process Circuit Board, Sensor Circuit Board, Lens Block	3-2-2

1) Remove three (3) screws holding the control switch block. (See Fig. 2-26)
2) Remove the control switch block from the left case in the direction of the arrow.

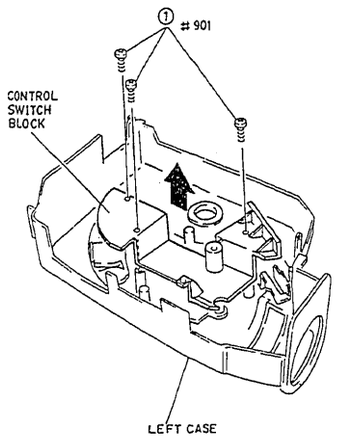


Fig. 2-26

3-3. VCR SECTION (RIGHT CASE SIDE) REMOVAL

Note: Set the unit to the eject state. Apply DC3V to pin 1 of CN904 (loading motor) to set the unit to the eject state with the camera section removed (use CN904 pin 2 ground).

3-3-1. Right Case, VCR Block, Tripod Mount

ORDER FOR REMOVING PARTS	ITEM No.
- Cassette Lid	3-1-1

1) Remove four (4) screws holding the right case. (See Fig. 2-27)
2) Remove the right case from the VCR block in the direction of arrow (B) while pushing the cassette holder in the direction of arrow (A).
3) Remove two (2) screws holding the tripod mount.
4) Remove the tripod mount from the right case in the direction of arrow (C).

Note: Reinstall the right case by the following procedure, taking care of the AV jack cover.
① Attach the clock battery cover to the right case.
② Close the AV jack cover.
③ Push the cassette holder in the direction of arrow (A) and hold it, then attach the right case to the VCR block. The AV jack cover opens at this time. Do not close the AV jack cover while attaching the right case.
④ Tighten the right case holding screws and close the AV jack cover.

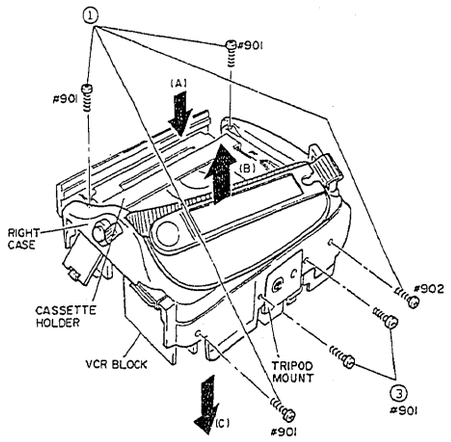


Fig. 2-27

3-3-2. Zoom Switch Panel

ORDER FOR REMOVING PARTS	ITEM No.
- Cassette Lid	3-1-1

1) Relase two (2) tabs and remove the zoom switch plate from the sub chassis in the direction of the arrow. (See Fig. 2-28)

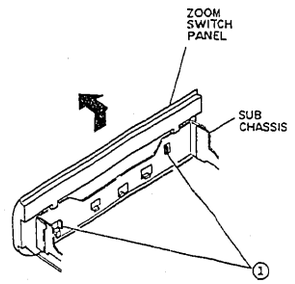


Fig. 2-28

3-3-3. Jack Circuit Board

ORDER FOR REMOVING PARTS	ITEM No.
- Cassette Lid	3-1-1
- Right Case, VCR Block	3-3-1

1) Disconnect one (1) flat cable (CN910) on the main circuit board. (See Fig. 2-29)
2) Remove the jack circuit board from the VCR frame in the direction of the arrow.

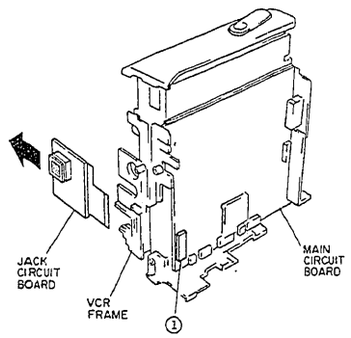


Fig. 2-29

3-3-4. Regulator Block

ORDER FOR REMOVING PARTS	ITEM No.
- Cassette Lid	3-1-1
- Right Case, VCR Block	3-3-1

1) Release one (1) tab and remove the regulator block from the main circuit board in the direction of the arrow. (The regulator block and main circuit board are connected via board-in type connector.) (See Fig. 2-30)

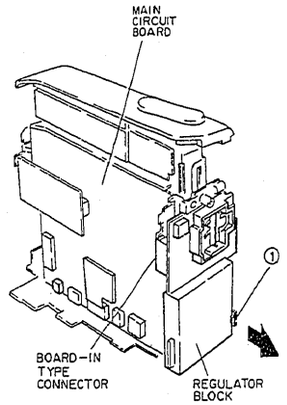


Fig. 2-30

3-3-5. Main Circuit Board, Audio IC (IC401)

ORDER FOR REMOVING PARTS	ITEM No.
- Cassette Lid	3-1-1
- Right Case, VCR Block	3-3-1
- Regulator Block	3-3-4

1) Release one (1) tab and remove the audio IC (IC401) from the main circuit board in the direction of arrow (A). (See Fig. 2-31)
2) Disconnect five (5) flat cables (CN112, CN602, CN905, CN907, CN910) on the main circuit board.
3) Disconnect two (2) connectors (CN113, CN904) on the main circuit board.
4) Release two (2) tabs and open the main circuit board in the direction of arrow (B).
5) Disconnect three (3) flat cables (CN601, CN604, CN906) on the main circuit board and remove the main circuit board from the tape transport mechanism. (See Fig. 2-32)

Note: Adjust as follows after installing the main circuit board.
CHAPTER 4
·Setting the Head Switching Point
·Setting the Power Shut Off Level

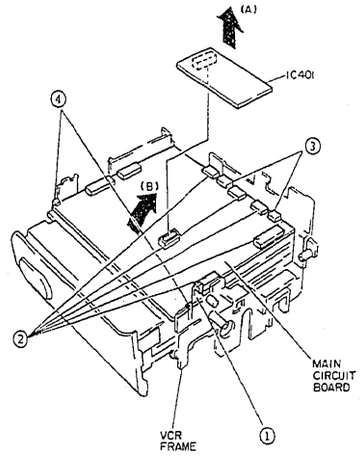


Fig. 2-31

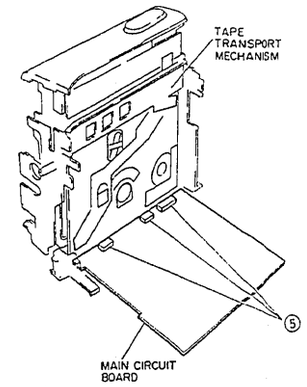


Fig. 2-32

3-3-6. Tape Transport Mechanism

ORDER FOR REMOVING PARTS	ITEM No.
- Cassette Lid	3-1-1
- Right Case, VCR Block	3-3-1
- Audio IC (IC401)	3-3-5

1) Disconnect four (4) flat cables (CN112, CN602, CN905, CN907) on the main circuit board. (See Fig. 2-33)
2) Disconnect two (2) connectors (CN113, CN904) on the main circuit board.
3) Remove three (3) screws holding the VCR frame and open the VCR frame with the main circuit board in the direction of the arrow.
4) Disconnect three (3) connectors (CN601, CN604, CN906) on the main circuit board and remove the VCR frame with the main circuit board from the tape transport mechanism. (See Fig. 2-34)

3-3-7. VCR Frame

ORDER FOR REMOVING PARTS	ITEM No.
- Cassette Lid	3-1-1
- Right Case, VCR Block	3-3-1
- Jack Circuit Board	3-3-3
- Regulator Block	3-3-4
- Main Circuit Board	3-3-5

1) Remove three (3) screws holding the VCR frame and remove the VCR frame from the tape transport mechanism. (See Fig. 2-33)

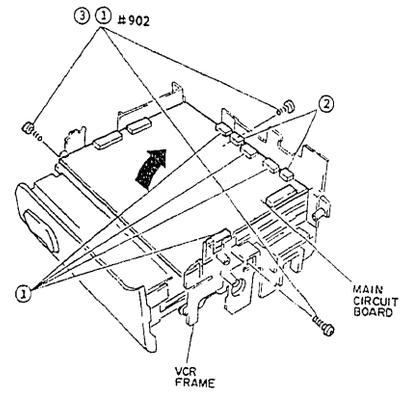


Fig. 2-33

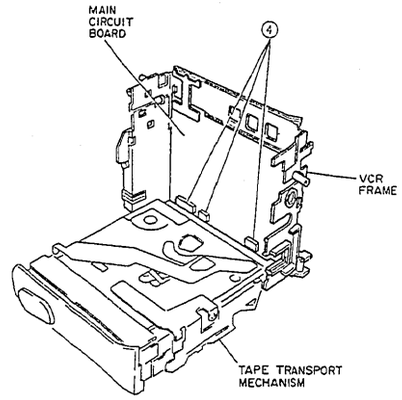


Fig. 2-34

3-4. SUB CHASSIS ASSEMBLY REMOVAL

ORDER FOR REMOVING PARTS	ITEM No.
- Tape Transport Mechanism	3-3-6

Note 1: Before removing the sub chassis assembly, be sure to set the mechanical block to the eject state.

3-4-1. Main Chassis Bracket (1), (2), (3)
Note: Lower the cassette holder to lock it when removing main chassis bracket (1), (2) and (3).
1) Remove two (2) screws holding the main chassis bracket (1). (See Fig. 2-41)
2) Remove three (3) screws holding the main chassis bracket (2).
3) Remove four (4) screws holding the main chassis bracket (3).

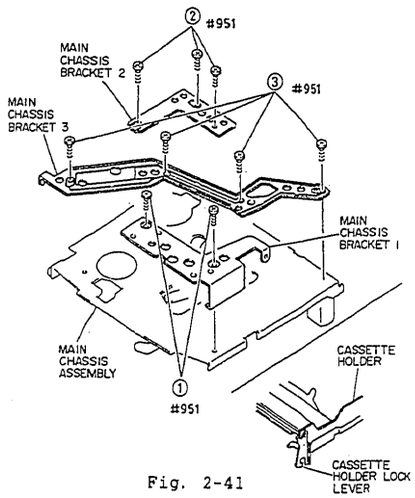


Fig. 2-41

3-4-2. Cassette Holder Damper, Cassette Holder

(1) Cassette Holder Damper
1) Remove one (1) E-ring holding the cassette holder damper. (See Fig. 2-42)
2) Remove the cassette holder damper from the sub chassis.

(2) Cassette Holder
3) Remove one (1) screw holding the cassette holder. (See Fig. 2-42)
4) Remove two (2) screws holding the cassette holder. (See Fig. 2-43)
5) Move engaged section (A) of the holder from the main chassis. (See Fig. 2-42) The cassette holder shaft comes to section (C) of the cassette holder slide groove. Push the cassette holder slide chassis in to release the cassette holder shaft from the cassette holder and sub chassis.
6) Move the cassette holder in the direction of arrow (D). (See Fig. 2-43) The cassette holder shaft comes to section (E) of the cassette holder slide groove. Push the cassette holder slide chassis in to release the cassette holder shaft from the cassette holder and sub chassis.

Note: Be careful not to band (damage) the cassette holder, cassette holder slide chassis and sub chassis when removing and reinstalling the cassette holder.
Reinstalling the cassette holder by the reverse procedure to removal.

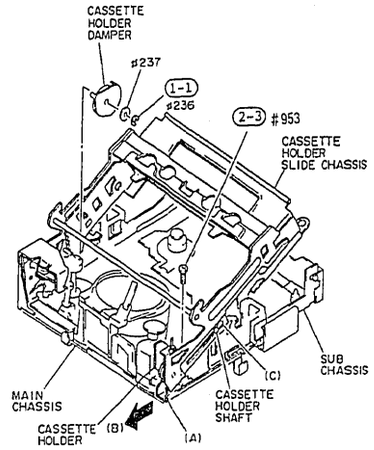


Fig. 2-42

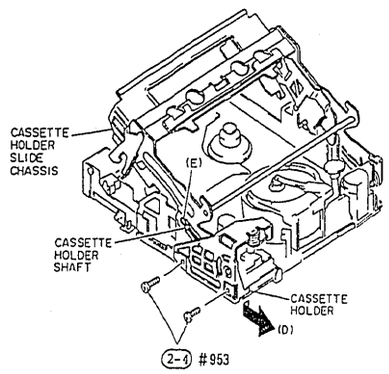


Fig. 2-43

3-4-3. Sub Chassis Cover

ORDER FOR REMOVING PARTS	ITEM No.
- Cassette Holder Damper, Cassette Holder	3-4-2

1) Remove three (3) screws holding the sub chassis cover. (See Fig. 2-44)
2) Release one (1) tab and remove the end LED from the sub chassis cover.

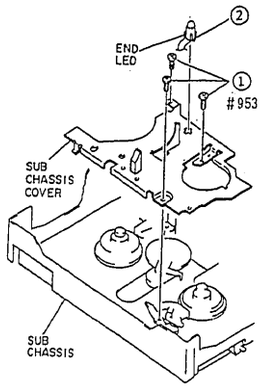


Fig. 2-44

3-4-4. Reel Drive Idler, Sub Chassis Assembly

ORDER FOR REMOVING PARTS	ITEM No.
- Cassette Holder Damper, Cassette Holder	3-4-2
- Sub Chassis Cover	3-4-3

(1) Reel Drive Idler
1) Remove one (1) washer holding the reel drive idler. (See Fig. 2-45)
2) Pull out the reel drive idler from the main chassis.

(2) Sub Chassis Assembly
3) Apply DC3V to the loading motor (CN904) so the sub chassis performs loading until screw (A) holding the sub chassis can be seen. When screw (A) can be seen, disconnect DC3V from the loading motor and stop loading. (See Fig. 2-46)
4) Remove screw (A) and apply DC3V to the loading motor in the reverse way to step 3) to set the sub chassis to the eject state.
5) Remove one (1) washer holding the middle pole. (See Fig. 2-47)
6) Remove two (2) screws holding the sub chassis.
7) Pull out the shaft of middle pole from the main chassis and remove the sub chassis assembly in the direction of the arrow.

Note 1: Be careful that the trouble sensor assembly (flat cable) is not damaged when removing the sub chassis assembly.

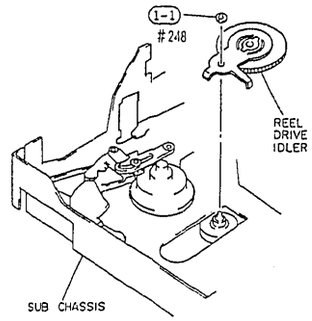


Fig. 2-45

LEAD WIRE	RED	BLACK
LOADING	−	+
UNLOADING	+	−

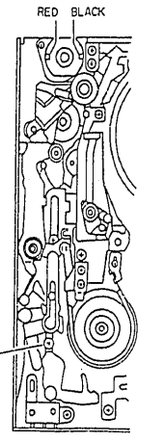


Fig. 2-46

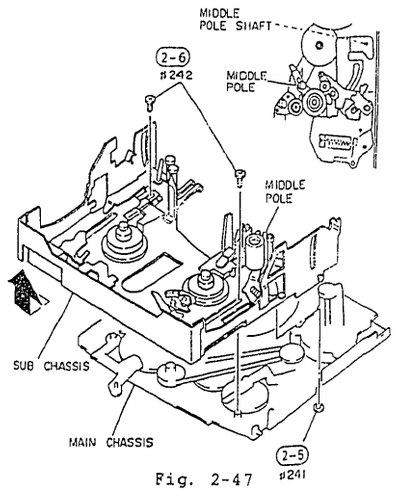


Fig. 2-47

3-5. MAIN MECHANICAL COMPONENTS ON THE SUB CHASSIS

ORDER FOR REMOVING PARTS	ITEM No.
- Tape Transport Mechanism	3-3-6
- Cassette Holder Damper, Cassette Holder	3-4-2

3-5-1. Supply Reel Brake, Tension Relay Arm, Tension Control Arm

ORDER FOR REMOVING PARTS	ITEM No.
• Sub Chassis Cover	3-4-3

1) Remove one (1) washer and pull out the supply reel brake from the sub chassis. (See Fig. 2-48)
2) Remove one (1) washer holding the tension relay arm.
3) Remove one (1) washer holding the tension control arm.
4) Pull out the tension relay arm and tension control arm from the sub chassis.

Note: Refer to Fig. 2-49 when reinstalling the tension relay arm and tension control arm.

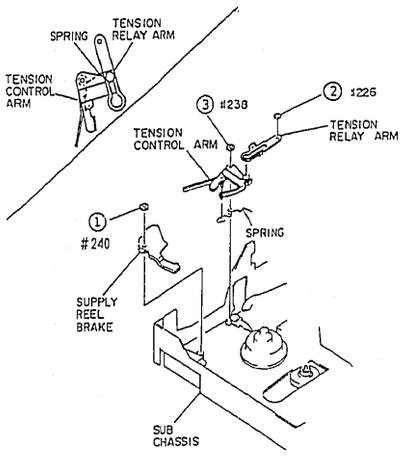
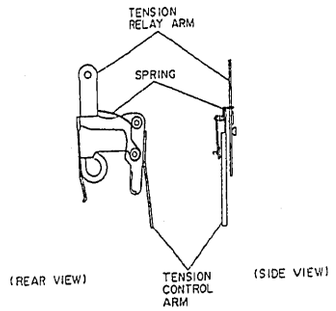


Fig. 2-48



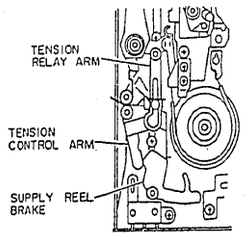


Fig. 2-49

3-5-2. Take-up Brake Control Arm, Take-up Brake Drive Arm, Take-up Reel Brake, Take-up Reel Disk

ORDER FOR REMOVING PARTS	ITEM No.
- Sub Chassis Cover	3-4-3

1) Pull out the take-up brake control arm from the sub chassis. (See Fig. 2-50)
2) Release the spring between the take-up brake drive arm and sub chassis.
3) Remove one (1) washer and pull out the take-up brake drive arm from the sub chassis.
4) Remove one (1) washer and pull out the take-up reel brake from the sub chassis.
5) Pull out the take-up reel disk from the sub chassis.

Note 1: Adjust as follows after installing the take-up reel disk.
- CHAPTER 3
3-1. REEL DISK HEIGHT ADJUSTMENT.

Note 2: Refer to Fig. 2-51 when reinstalling the take-up brake control arm, take-up brake drive arm and take-up reel brake.

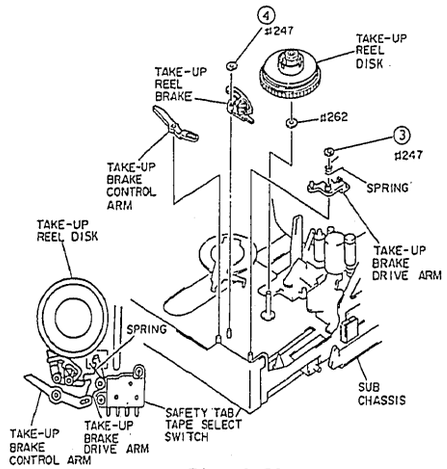
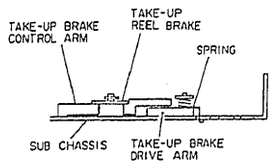


Fig. 2-50



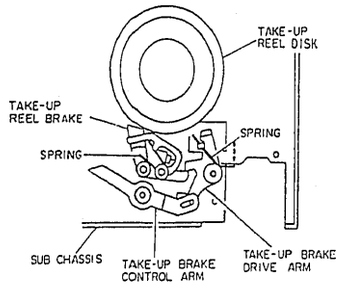


Fig. 2-51

3-5-3. Tension Arm, Supply Guide Roller (3), Tension Band, Guide Roller Spring

ORDER FOR REMOVING PARTS	ITEM No.
• Sub Chassis Cover	3-4-3
• Supply Reel Brake, Tension Relay Arm, Tension Control Arm	3-5-1

1) Remove one (1) screw holding the tension band. (See Fig. 2-52)
2) Release the tension spring between the tension arm and sub chassis.
3) Remove one (1) washer holding the tension arm and supply guide roller (3).
4) Pull out the tension arm, supply guide roller (3) and tension band from the sub chassis.
5) Release two (2) tabs and remove the tension band from the tension arm.
6) Remove one (1) washer holding the guide roller spring.

Note 1: Adjust as follows after installing the tension arm and tension band.
- CHAPTER 3
3-2. TENSION POLE POSITION ADJUSTMENT.
3-3. TENSION ADJUSTMENT.

Note 2: Refer to Fig. 2-53 when reinstalling the guide roller spring.

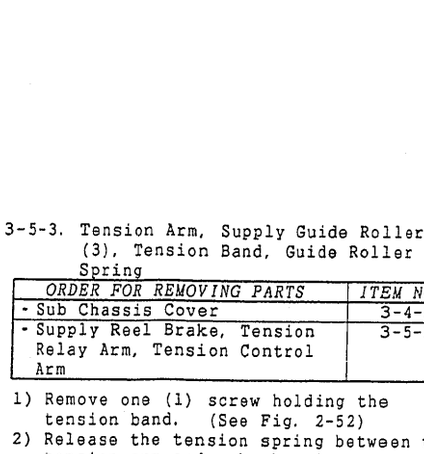


Fig. 2-52

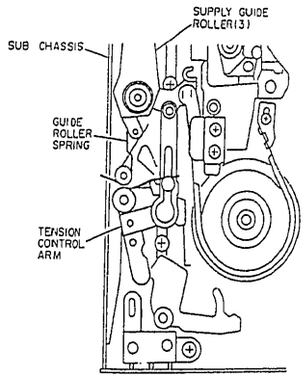


Fig. 2-53

3-5-4. Pressure Roller, Take-up Guide Arm, Middle Pole

ORDER FOR REMOVING PARTS	ITEM No.
• Sub Chassis Cover	3-4-3

1) Remove one (1) screw holding the pressure roller hold plate. (See Fig. 2-54)
2) Remove the pressure roller hold plate from the sub chassis.

(1) Pressure Roller
3) Release the spring between the pressure roller and sub chassis. (See Fig. 2-54)
4) Pull out the pressure roller from the sub chassis.

(2) Take-up Guide Arm, Middle Pole
3) Pull out the take-up guide arm from the sub chassis. (See Fig. 2-54)
4) Remove one (1) washer holding the middle pole shaft. (See Fig. 2-55)
5) Pull out the middle pole from the main chassis. (See Fig. 2-54)

Note 1: Adjust as follows after installing the take-up guide arm.
- CHAPTER 3
3-5. TAKE-UP GUIDE POLE/ TAKE-UP GUIDE POST HEIGHT ADJUSTMENT.

Note 2: Check that there in no gap between the upper and lower arms of the pressure roller when reinstalling the pressure roller.

Note 3: Refer to Fig. 2-56 when reinstalling the pressure roller, take-up guide arm and middle pole.

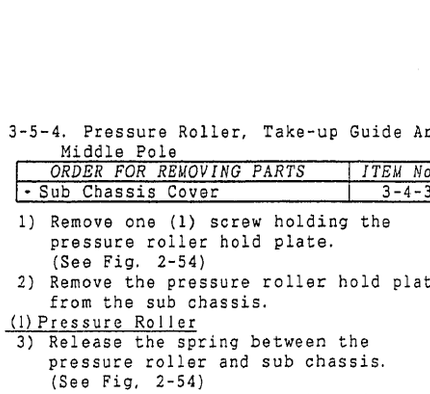


Fig. 2-54

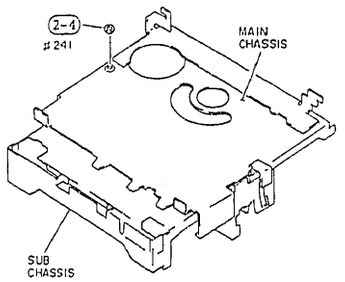


Fig. 2-55

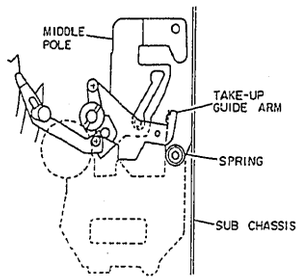


Fig. 2-56

3-5-5. Take-up Guide Roller Base, Supply Guide Roller Base

ORDER FOR REMOVING PARTS	ITEM No.
- Sub Chassis Cover	3-4-3
- Reel Drive Idler, Sub Chassis Assembly	3-4-4

(1) Take-up Guide Roller Base

1) Turn the take-up loading link gear in the direction of arrow (A) by 180°. (See Fig. 2-57)
2) Move the take-up loading link gear in the direction of arrow (C). (See Fig. 2-58)
3) Hold the tab of the take-up loading link gear using tweezers, etc. and lift the link gear in the direction of arrow (D), then remove the link gear in the direction of arrow (E).

(2) Supply Guide Roller Base

1) Turn the supply loading link gear in the direction of arrow (B) by 180°. (See Fig. 2-57)
2) Move the supply loading link gear in the direction of arrow (C). (See Fig. 2-58)
3) Hold the tab of the supply loading link gear using tweezers, etc. and lift the link gear in the direction of arrow (D), then remove the link gear in the direction of arrow (E).

Note 1: Adjust as follows after installing the take-up and supply guide roller bases.
- CHAPTER 3
3-6. SUPPLY GUIDE ROLLER (1)/ TAKE-UP GUIDE ROLLER HEIGHT ADJUSTMENT.

Note 2: Be careful not to bend the tab of the take-up and supply loading link gears.

Note 3: Reinstalling the take-up and supply guide roller bases by the reverse procedure to removal.

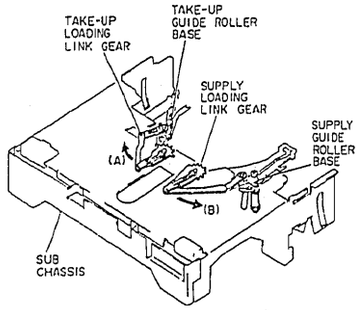


Fig. 2-57

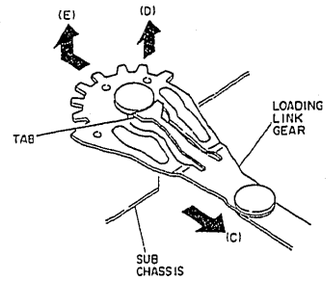


Fig. 2-58

3-5-6. Take-up Guide Roller Rail, Supply Guide Roller Rail, Supply Reel Disk

ORDER FOR REMOVING PARTS	ITEM No.
- Sub Chassis Cover	3-4-3
- Reel Drive Idler, Sub Chassis Assembly	3-4-4

(1) Take-up Guide Roller Rail

1) Remove the take-up guide roller base. (See Figs. 2-57, 2-58)
2) Remove one (1) screw holding the take-up guide roller rail. (See Fig. 2-59)

(2) Supply Guide Roller Rail, Supply Reel Disk

1) Remove the supply guide roller base. (See Figs. 2-57, 2-58)
2) Remove two (2) screws holding the supply guide roller rail and tension band holder. (See Fig. 2-59)
3) Pull out the supply reel disk from the sub chassis.

Note: Adjust as follows after installing the supply reel disk.
- CHAPTER 3
3-1. REEL DISK HEIGHT ADJUSTMENT.

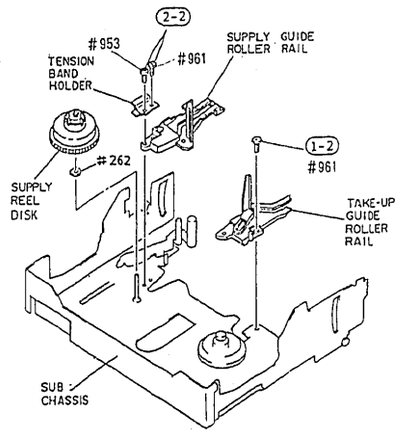


Fig. 2-59

3-5-7. Trouble Sensor Assembly (Supply End Sensor, Take-up End Sensor, Take-up Reel Sensor, End LED, Safety Tab/ Tape Select Switch, Tape Thickness Switch)

ORDER FOR REMOVING PARTS	ITEM No.
- Sub Chassis Cover	3-4-3
- Reel drive Idler, Sub Chassis Assembly	3-4-4
- Take-up Guide Roller Base	3-5-5
- Take-up Guide Roller Rail	3-5-6

1) Remove one (1) screw holding the safety tab/tape select switch. (See Fig. 2-60)
2) Remove one (1) screw holding the tape thickness switch
3) Remove one (1) screw holding the take-up end sensor. (See Fig. 2-61)
4) Remove one (1) screw holding the supply end sensor.
5) Peel out the trouble sensor assembly from the sub chassis.

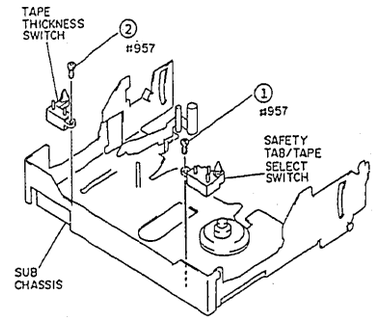


Fig. 2-60

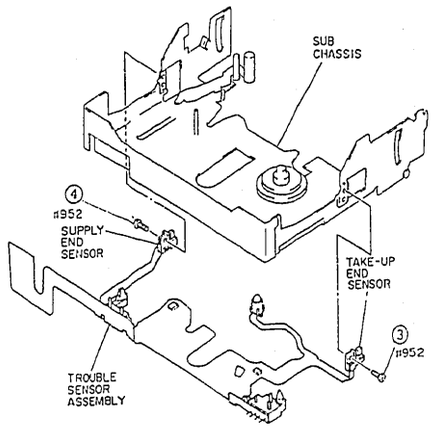


Fig. 2-61

3-6. MAIN MECHANICAL COMPONENTS ON THE MAIN CHASSIS REMOVAL

ORDER FOR REMOVING PARTS	ITEM No.
- Tape Transport Mechanism	3-3-6
- Cassette Holder Damper, Cassette Holder	3-4-2

3-6-1. Sub Chassis Slide Arm, Supply Brake Gear

ORDER FOR REMOVING PARTS	ITEM No.
- Sub Chassis Cover	3-4-3
- Reel Drive Idler, Sub Chassis Assembly	3-4-4

(1) Sub Chassis Slide Arm

1) Pull out the sub chassis slide arm and spacer from the main chassis. (See Fig. 2-62)

(2) Supply Brake Gear

1) Pull out the supply brake gear from the main chassis (See Fig. 2-62)

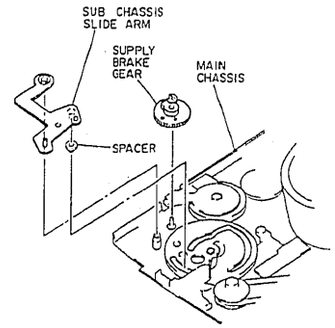


Fig. 2-62

3-6-2. Cylinder Assembly

1) Remove three (3) screws and remove the cylinder assembly from the main chassis. (See Fig. 2-63)

Note: Be careful that your fingers or tools do not touch the video head tips during work.
Attach the cylinder after reinstalling all other components.
Adjust as follows after installing the cylinder assembly.
- CHAPTER 3
4. ADJUSTMENTS AFTER REPLACING CYLINDER.

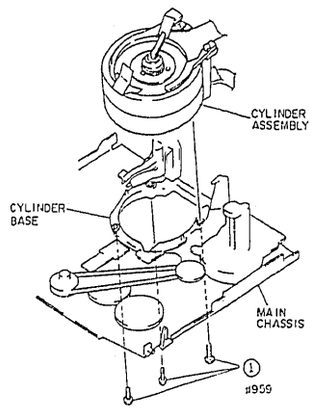


Fig. 2-63

3-6-3. Capstan Motor, Guide Roller Relay Rail (1)

(1) Capstan Motor

1) Remove three (3) screws holding the capstan motor. (See Fig. 2-64)
2) Remove the capstan motor from the main chassis.

(2) Guide Roller Relay Rail (1)

3) Pull out guide roller relay rail (1) from the main chassis. (See Fig. 2-64)

Note: Adjust as follows after installing the capstan motor.
- CHAPTER 3
3-5. TAKE-UP GUIDE POLE/TAKE-UP GUIDE POST HEIGHT ADJUSTMENT.

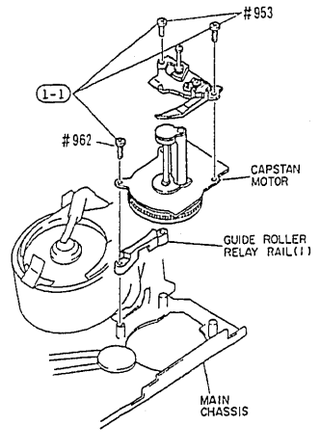


Fig. 2-64

3-6-4. Supply Guide Roller (2), Supply Tape Guide, Loading Motor

(1) Supply Guide Roller (2), Supply Tape Guide

1) Remove one (1) washer holding the supply guide roller (2). (See Fig. 2-65)
2) Remove two (2) screws holding the supply tape guide.
3) Remove the supply guide roller (2) and supply tape guide from the main chassis.

(2) Loading Motor

4) Remove one (1) screw and remove the loading motor from the main chassis. (See Fig. 2-65)

Note 1: Adjust as follows after installing the loading motor.
- CHAPTER 3
2. PHASE MATCHING IN ASSEMBLY

Note 2: Adjust as follows after installing the supply guide roller (2).
- CHAPTER 3
3-4. SUPPLY GUIDE ROLLER (2) HEIGHT ADJUSTMENT.

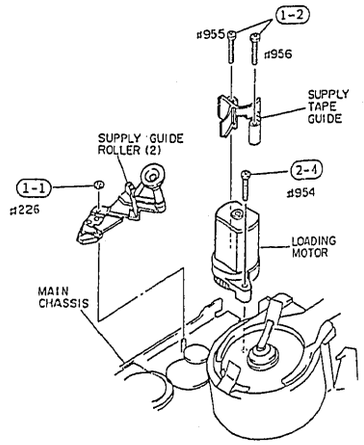


Fig. 2-65

3-6-5. Loading Gears (1), (2), (3), Mechanism State Switch

Note: Remove the sub chassis assembly from the main chassis as previously given.

ORDER FOR REMOVING PARTS	ITEM No.
- Main Chassis Bracket (1), (2)	3-4-1
- Supply Guide Roller (2), Supply Tape Guide, Loading Motor	3-6-4

(1) Loading Gear (2)

1) Remove one (1) washer holding the loading gear (2). (See Fig. 2-66)
2) Pull out loading gear (2) from the main chassis.

(2) Loading Gear (1)

3) Remove one (1) washer holding the loading gear (1). (See Fig. 2-66)
4) Pull out loading gear (1) from the main chassis.

(3) Loading Gear (3), Mechanism State Switch

3) Remove one (1) screw holding the loading gear holder. (See Fig. 2-66)
4) Pull out loading gear (3) and mechanism state switch from the main chassis.
5) Peel out the flat cable of the mechanism state switch from the main chassis. (See Fig. 2-67)

Note: Adjust as follows after installing the loading gears (1), (2), (3) and mechanism state switch.
- CHAPTER 3
2. PHASE MATCHING IN ASSEMBLY.

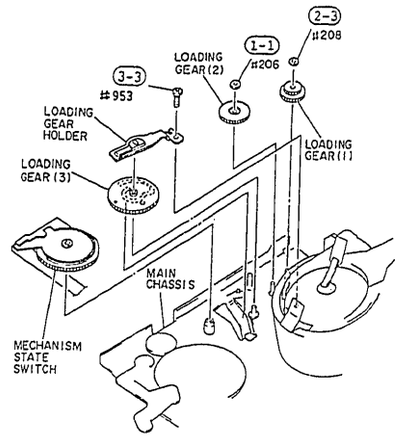


Fig. 2-66

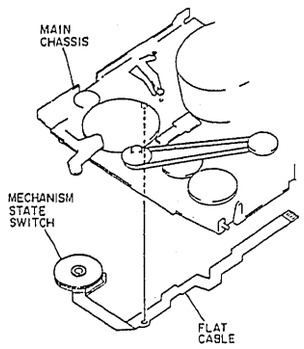


Fig. 2-67

3-6-6. Supply Loading Cam Gear

Note: Remove the sub chassis assembly from the main chassis as previously given.

ORDER FOR REMOVING PARTS	ITEM No.
- Sub Chassis Slide Arm	3-6-1

1) Remove two (2) screws holding the supply loading cam gear holder. (See Fig. 2-68)
2) Remove one (1) screw holding the supply loading cam gear.
3) Remove the supply loading cam gear from the main chassis.

Note: Adjust as follows after installing the supply loading cam gear.
- CHAPTER 3
2. PHASE MATCHING IN ASSEMBLY.

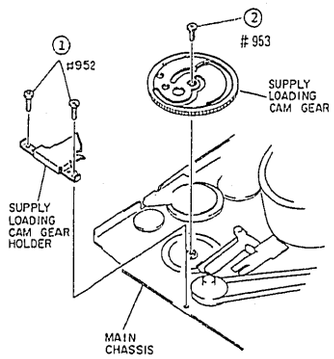


Fig. 2-68

3-6-7. Center Gear, Center Relay Gear, Reel Drive Belt

Note: Remove the sub chassis assembly from the main chassis as previously given.

ORDER FOR REMOVING PARTS	ITEM No.
- Capstan Motor	3-6-3

1) Remove one (1) washer holding the center relay gear. (See Fig. 2-69)
2) Pull out the center gear and center relay gear with the reel drive belt from the main chassis.

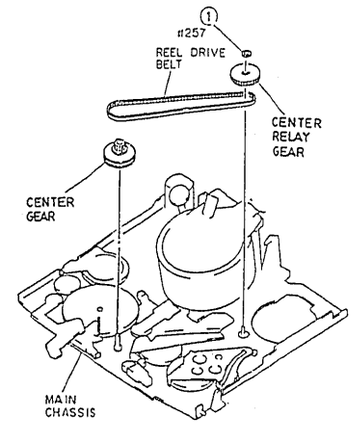


Fig. 2-69

3-6-8. Pressure Roller Drive Arm, Eject Arm, Take-up Loading Cam Gear

Note: Remove the sub chassis assembly from the main chassis as previously given.

(1) Pressure Roller Drive Arm

1) Remove one (1) screw holding the pressure roller drive arm. (See Fig. 2-70)
2) Remove the pressure roller drive arm from the main chassis.

(2) Eject Arm

3) Remove one (1) screw holding the eject arm. (See Fig. 2-70)

4) Remove the eject arm from the main chassis.

(3) Take-up Loading Cam Gear

3) Remove one (1) screw holding the take-up loading cam gear. (See Fig. 2-70)
4) Remove the take-up loading cam gear from the main chassis.

Note: Adjust as follows after installing the take-up loading cam gear.
- CHAPTER 3
2. PHASE MATCHING IN ASSEMBLY.

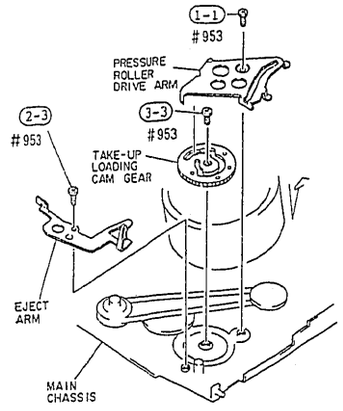


Fig. 2-70

3-6-9. Cylinder Base, Guide Roller Relay Rail (2), Slide Gear

Note 1: Remove the sub chassis assembly from the main chassis as previously given.

ORDER FOR REMOVING PARTS	ITEM No.
- Cylinder Assembly	3-6-2
- Supply Guide Roller (2), Supply Tape Guide, Loading Motor	3-6-4

Note 2: Never remove the catcher blocks from the cylinder base. The catcher blocks and cylinder base are supplied in the assembled state as a service part.

(1) Cylinder Base

1) Remove two (2) screws holding the cylinder base. (See Fig. 2-71)
2) Remove the cylinder base and slide gear plate from the main chassis.

(2) Guide Roller Relay Rail (2)

3) Remove ons (1) screw holding the guide roller relay rail (2). (See Fig. 2-71)
4) Remove guide roller relay rail (2) from the main chassis.

(3) Slide Gear

3) Remove the slide gear in the direction of the arrow from the main chassis. (See Fig. 2-71)

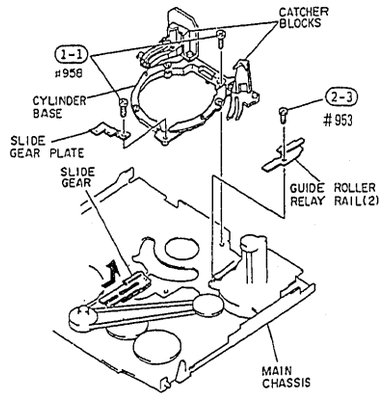


Fig. 2-71

3-6-10. Reel Drive Belt Cover

Note: Remove the sub chassis assembly from the main chassis as previously given.

ORDER FOR REMOVING PARTS	ITEM No.
- Cylinder Assembly	3-6-2
- Capstan Motor	3-6-3
- Center Gear, Center Relay Gear, Reel Drive Belt	3-6-7
- Cylinder Base, Slide Gear	3-6-9

1) Remove two (2) screws holding the reel belt cover. (See Fig. 2-72)
2) Remove the reel drive belt cover from the main chassis.

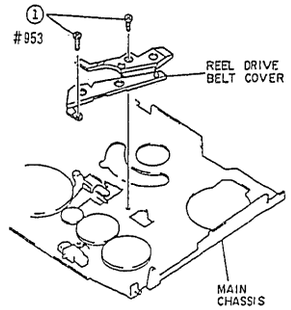


Fig. 2-72

3-6-11. Cassette Holder Switch/Dew Sensor

Note: Remove the sub chassis assembly from the main chassis as previously given.

ORDER FOR REMOVING PARTS	ITEM No.
- Main Chassis Bracket (1), (2)	3-4-1
- Cylinder Assembly	3-6-2
- Supply Guide Roller (2), Supply Tape Guide, Loading Motor	3-6-4
- Loading Gear (2), (3), Mechanism State Switch	3-6-5
- Cylinder Base	3-6-9

1) Remove one (1) screw holding the cassette holder switch. (See Fig. 2-73)
2) Peel out the cassette holder switch/dew sensor from the main chassis. (See Fig. 2-74)

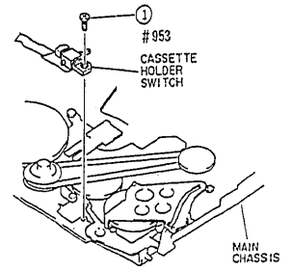


Fig. 2-73

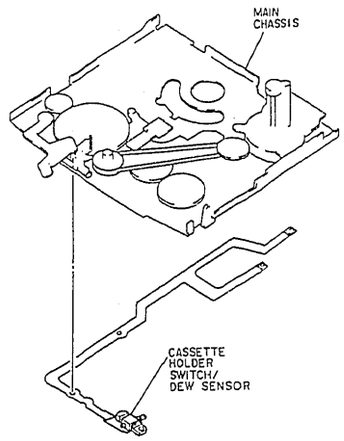


Fig. 2-74

3-7. LENS BLOCK REMOVAL

ORDER FOR REMOVING PARTS	ITEM No.
- Lens Block	3-2-2

3-7-1. Autofocus Circuit Board, Zoom Motor

(1) Autofocus Circuit Board

1) Disconnect four (4) connectors on the autofocus circuit board. (See Fig. 2-101)
2) Remove one (1) screw holding the autofocus circuit board
3) Open the autofocus circuit board from the lens.
4) Unsolder two (2) connectors on the autofocus circuit board.

(2) Zoom Motor

5) Remove one (1) screw holding the zoom motor. (See Fig. 2-101)
6) Remove the zoom motor from the lens block in the direction of the arrow.

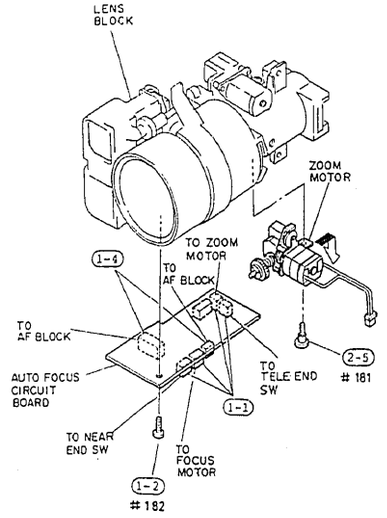


Fig. 2-101

3-7-2. Focus Motor, Iris Block

(1) Focus Motor

1) Disconnect connector on the autofocus circuit board. (See Fig. 2-102)
2) Remove one (1) screw holding the focus motor. (See Fig. 2-103)
3) Remove the focus motor from the lens block in the direction of arrow (A).

(2) Iris Block

Note 1: Move the relay (backfocus) lens backwards when removing the iris block. Take great care that no dust adheres to the iris block and not scratch it.

1) Remove one (1) screw holding the iris block. (See Fig. 2-103)
2) Remove the iris block from the lens block in the direction of arrow (B).

Note 2: Be sure to perform the backfocus adjustment after installing the iris block.

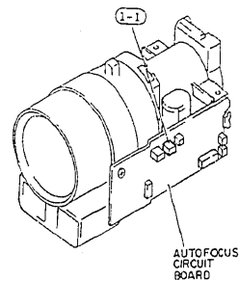


Fig. 2-102

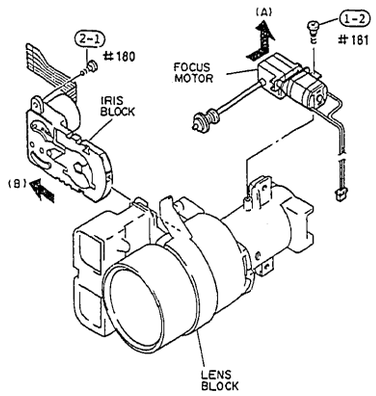


Fig. 2-103

3-7-3. AF Block

ORDER FOR REMOVING PARTS	ITEM No.
- Focus Motor	3-7-2

1) Disconnect connector on the autofocus circuit board. (See Fig. 2-104)
2) Unsolder two (2) connectors on the autofocus circuit board. (See Fig. 2-105)
3) Remove two (2) screws holding the AF block.
4) Remove the AF block from the lens block.

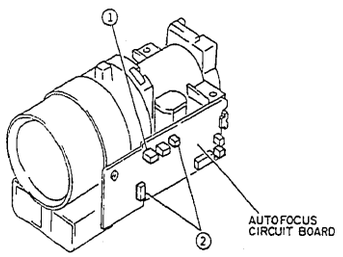


Fig. 2-104

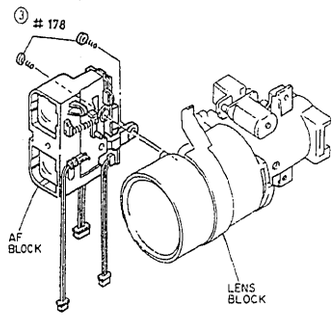


Fig. 2-105

3-7-4. Index Ring

ORDER FOR REMOVING PARTS	ITEM No.
- Autofocus Circuit Board	3-7-1

1) Set the zoom ring to the telephoto end and turn the focus ring to the infinity (∞) end. (See Fig. 2-106)
2) Remove one (1) screw holding the index ring.
3) Turn the index ring in the direction of the arrow to release one (1) tab.
4) Release one (1) tab holding the index ring . (See Fig. 2-107)

Note: Be careful not to damage the zoom ring or focus ring.

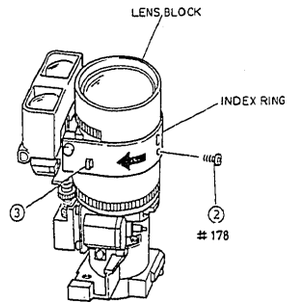


Fig. 2-106

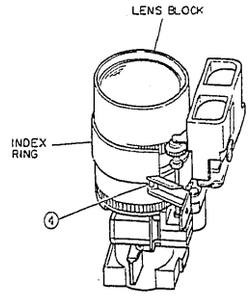


Fig. 2-107

3-8. ELECTRONIC VIEWFINDER (EVF) REMOVAL

ORDER FOR REMOVING PARTS	ITEM No.
- Electronic Viewfinder (EVF)	3-2-1

3-8-1. EVF Lens Block, EVF Left Case

(1) EVF Lens Block

1) Turn the EVF lens block in the direction of arrow (A). (See Fig. 2-121)
2) Remove the EVF lens block in the direction of arrow (B).

(2) EVF Left Case

1) Remove four (4) screws holding the EVF left and EVF right cases. (See Fig. 2-121)
2) Remove the EVF left case from the EVF block in the direction of arrow (C).

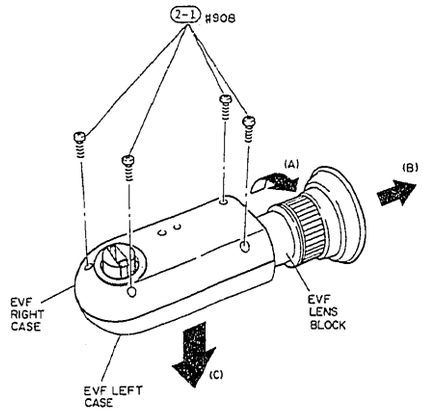


Fig. 2-121

3-8-2. EVF Right Case

ORDER FOR REMOVING PARTS	ITEM No.
- EVF Left Case	3-8-1

1) Remove the EVF circuit board, CRT and EVF lens block from the right case in the direction of the arrow. (See Fig. 2-122)

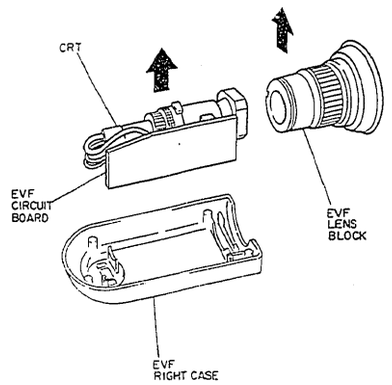


Fig. 2-122

3-8-3. EVF Circuit Board, CRT

ORDER FOR REMOVING PARTS	ITEM No.
- EVF Left Case	3-8-1
- EVF Right Case	3-8-2

(1) EVF Circuit Board

1) Disconnect one (1) connector (CN801) on the EVF circuit Board and CRT socket. (See Fig. 2-123)

(2) CRT

2) Release four (4) tabs of the CRT frame and remove the CRT frame from the CRT. (See Fig. 2-123)

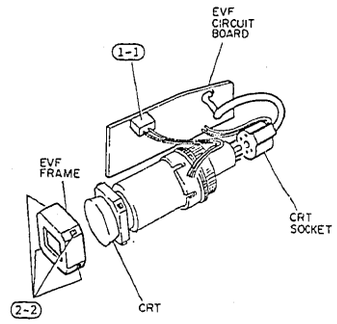
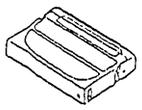
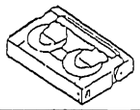
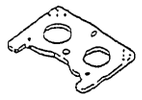
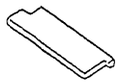
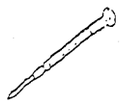
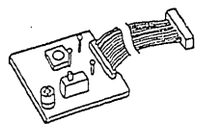
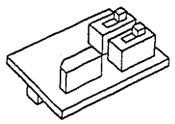
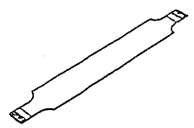
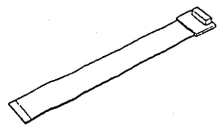
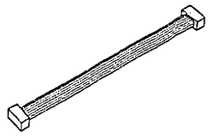
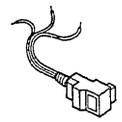
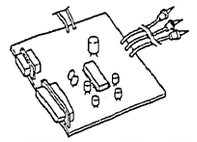
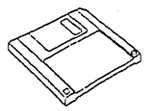
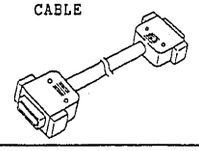


Fig. 2-123

JIG AND TAPES FOR ADJUSTMENT

Note: Mark "※" is new jigs and tools.

1. ALIGNMENT TAPE COLOR BAR/400Hz (20HSC-2) No. 7099231 	2. CASSETTE TORQUE METER SRK-8T-132 No. 7099235 SRK-8T-112 No. 7099385 	3. MASTER PLANE No. 7099237 	4. REEL DISK HEIGHT JIG No. 7099238 
5. SPECIAL DRIVER No. 7099239 	6. 0.7mm HEXAGONAL WRENCH No. 7099316	7. ATF JIG No. 7099386 	8. BACKFOCUS ADJ. DRIVER No. 7099370 
9. C12 LIGHT BALANCING FILTER No. 7099369	10. 2-PIN EXTENSION CABLE No. 7099283	※11. 18-PIN EXTENSION CABLE No. 7099451	※12. 10-PIN EXTENSION CABLE No. 7099452 
※13. 7-PIN EXTENSION CABLE No. 7099453 	※14. 4-PIN EXTENSION CABLE No. 7099454 	※15. 18-PIN EXTENSION CABLE No. 7099455	※16. DSP AV OUTPUT CABLE No. 7099456 
17. DSP JIG No. 7099442 	18. CAMERA ADJ. FLOPPY DISK No. 7099435 	19. PERSONAL COMPUTER	20. PERSONAL COMPUTER 9-PIN or 25-PIN CABLE 

HOW TO USE THE NEW JIGS AND TOOLS

No.	NAME OF JIG & TOOLS	PARTS No.	HOW TO USE (PURPOSE OF USE)
11	18-PIN EXTENSION CABLE	7099	· Installed between the main circuit board and process circuit board. · Used when the camera section is removed from the VCR section to adjust, etc.
12	10-PIN EXTENSION CABLE	7099	· Installed between the regulator block and process circuit board. · Used when the camera section is removed from the VCR section to adjust, etc.
13	7-PIN EXTENSION CABLE	7099	· Installed between the process circuit board and control switch block. · Used when the control switch block is removed from the process circuit board to adjust, etc.
14	4-PIN EXTENSION CABLE	7099454	· Installed between the EVF and process circuit board. · Used when the EVF is removed from the process circuit board to adjust, etc.
15	18-PIN EXTENSION CABLE	7099455	· Installed between the sensor circuit board and process circuit board. · Used when the process circuit board is removed from the sensor circuit board to adjust, etc.
16	DSP AV OUTPUT CABLE	7099456	· Used when the camera section (DSP circuit adjustment.

ATF JIG

1. ATF JIG

The ATF jig can be used in two way as follows.
The unassembled VCR block can be operated even if the 8mm video camera/recorder is not set to the test mode.

1-1. SETTING THE HEAD SWITCHING POINT AND POWER SHUT OFF LEVEL

Connect the ATF jig to CN612 on the main circuit board and supply power under the specified conditions. The head switching point and power shut off level can be set. Refer to the VCR adjustment in CHAPTER 4 for the setting methods.

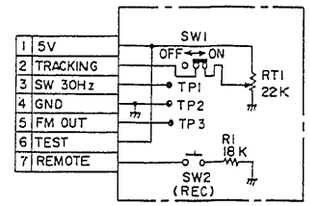
1-2. RELEASING THE AUTO TRACKING FUNCTION

Connect the ATF jig to CN612 on the main circuit board and set SW1 on the ATF jig to "ON".
The auto tracking function will be released. Used RT1 on the ATF jig as the tracking control.

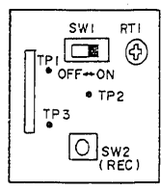
Caution: Be sure to set SW1 on the ATF jig to "OFF" when setting the head switching point and power shut off level.

ATF Jig Schematic

SW2 has the same function as the RECORD button.



ATF Jig Parts Location



SERVICING POSITION (WHEN OBSERVING WAVEFORM AND VOLTAGE)

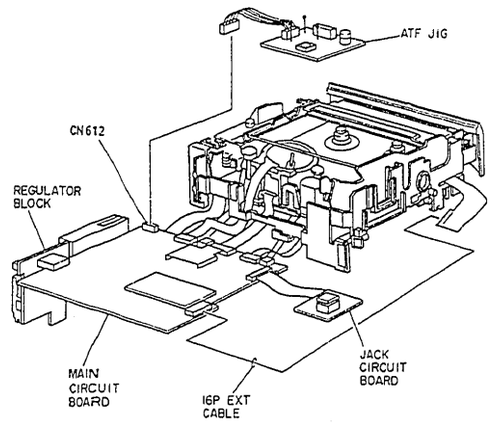


Fig. 3-A

CHAPTER 3
MECHANISM ADJUSTMENT

1. BEFORE STARTING ADJUSTMENT

- Remove the components shown in the table below beforehand, referring to the CHAPTER 2 DISASSEMBLY.

ORDER FOR REMOVING PARTS	*ITEM No.*
- Cassette Lid, MIC Jack Circuit Board	3-1-1
- Separating the Camera Section and VCR Section	3-1-3
- Right Case, VCR Block, Tripod Mount	3-3-1
- Zoom Switch Panel	3-1-5

- With this 8mm video camera/recorder, the mechanical adjustment (tape transport block check/adjustment) can be done with the unassembled VCR block. It is not necessary to set the 8mm video camera/recorder to the test mode.
- To set the unit to the playback mode without loading a cassette, block the light shining on the END LED on the sub chassis completely and press the playback (PLAY) button on the function switch (shade the light to the END LED in the eject state).

2. PHASE MATCHING IN ASSEMBLY (Figs. 3-1, 3-2, 3-3, 3-4)

Be sure to match the phases when reinstalling the loading motor, mechanism state switch, loading gear (1), (2) and (3), supply brake gear, supply loading cam gear and take-up loading cam gear.

Note: Set the 8mm video camera to the unloading stop mode (eject state) for phase matching in assembly. Do not reuse the washers which were removed.

REINSTALLING PROCEDURE:

1) Align marks (A) and (A') on the mechanism state switch and marks (B) and (B') on the rotor. (See Fig. 3-1)
2) Install the mechanism state switch in the condition set in step 1) into the main chassis. Check that mark (C) on the loading gear 3 and mark (A) on the mechanism state switch are aligned. (See Fig. 3-2)
   Check that the guide roller control arm slides all the way in the direction of the arrow. (See Fig. 3-2)
3) Install the supply loading cam gear into the main chassis so that mark (E) on the supply brake gear and mark (F) on the supply loading cam gear are aligned. (See Fig. 3-2)
   Check that mark (D) on the supply loading cam gear and mark (A') on the mechanism state switch are aligned.
4) Install the take-up loading cam gear into the main chassis so that hole (G) of the take-up loading cam gear and the hole in the main chassis overlap each other at this time. (See Fig. 3-3)
   Install the pressure roller drive arm as shown in the figure. (See Fig. 3-3)
5) Install the supply loading cam gear holder and sub chassis slide arm as shown in the figure. (See Fig. 3-4)

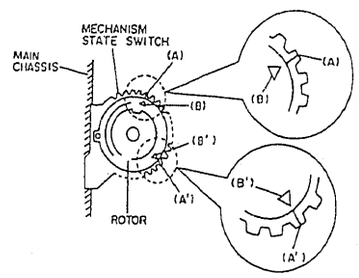


Fig. 3-1

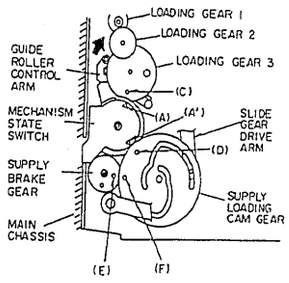


Fig. 3-2

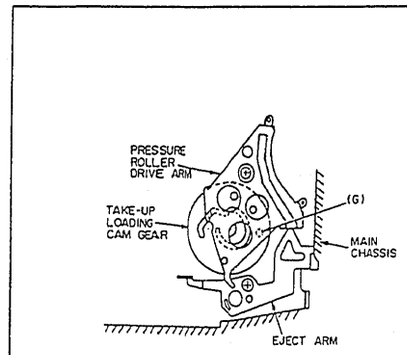


Fig. 3-3

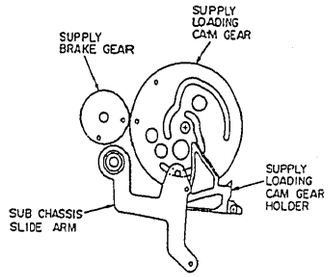


Fig. 3-4

3. TAPE TRANSPORT SYSTEM CHECK/ADJUSTMENT

The tape transport system is the path from the supply reel disk to the take-up reel disk via the cylinder. The tape transport components, especially the components which come into direct contact with the tape, should be kept clean without damage, dust and oil, etc. adhering to the contact surfaces.
The tape transport system is adjusted before shipment from the factory, so perform adjustments only when the transport are replaced or transport system adjustments have drifted. Do not reuse washers which have been removed.

3-1. REEL DISK HEIGHT ADJUSTMENT (Fig. 3-5)

Be sure to perform this adjustment after reinstalling the supply or take-up reel disk.

PURPOSE : To set the reel disk height to the specified value.		*FAULT DUE TO INCOMPLETE ADJUSTMENT*: Tape is not loaded normally.	
TEST EQUIPMENT/JIG	*STATE OF VCR*	*TEST POINT*	*ADJUSTMENT POINT*
- Master Plane - Reel Disk Height Jig	- Shut off the light from the END LED. - Mount the master plane, set the unit to the play mode and then the stop mode.		

ADJUSTMENT PROCEDURE:

Note 1: Use the same procedure for the supply and take-up sides.

1) Fit the reel disk height jig to the reel disk as shown in Fig. 3-5.
2) Adjust the washer at the bottom of the reel disk so that (C) of the reel disk is between (A) and (B) of the reel disk height jig.

Note 2: Thickness of take-up side washer is 0.25mm.

Note 3: Thickness of supply side washer is 0.13mm.

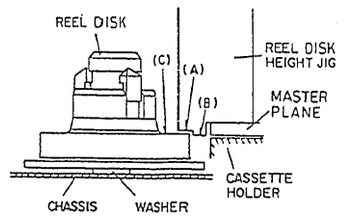


Fig. 3-5

3-2. TENSION POLE POSITION ADJUSTMENT (Fig. 3-6)

Be sure to perform this adjustment after reinstalling the tension arm, tension band and supply reel disk.

PURPOSE : To set the tape tension to the specified value.		*FAULT DUE TO INCOMPLETE ADJUSTMENT*: Tape is not loaded normally.	
TEST EQUIPMENT/JIG	*STATE OF VCR*	*TEST POINT*	*ADJUSTMENT POINT*
	Shut off the light from the end LED and set the play mode without loading a cassette.		

ADJUSTMENT PROCEDURE:

1) Set the tension spring to position (C) on the tension spring holder.
2) After loading is completed, loosen screw (E) holding the tension band holder.
3) Adjust the position of the tension band holder so the left of the hole in supply guide roller (3) is aligned with the inner flange of the tension arm.
4) After adjustment is completed, tighten screw (E).

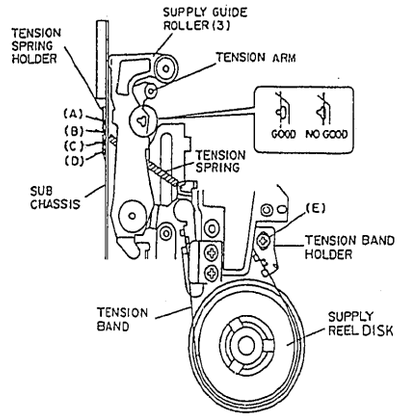


Fig. 3-6

3-3. TENSION ADJUSTMENT (Fig. 3-6)

Be sure to perform this adjustment after reinstalling the tension arm, tension band and supply reel disk.

PURPOSE : To set the tape tension to the specified value.		*FAULT DUE TO INCOMPLETE ADJUSTMENT*: Tape is not loaded normally.	
TEST EQUIPMENT/JIG	*STATE OF VCR*	*TEST POINT*	*ADJUSTMENT POINT*
- Cassette Torque Meter (SRK-8T-112)			

ADJUSTMENT PROCEDURE:

1) Set the tension spring to section (C) of the tension spring holder. (See Fig. 3-6)
2) Load the cassette torque meter and set the unit to the play mode.
3) Adjust the position of the tension spring so the tension on the supply side is 5.5 ~ 7.5 g-cm.
   ① If the tension is higher than 7.5 g-cm, hook the tension spring to section (D) of the tension spring holder.
   ② If the tension is lower than 5.5 g-cm, hook the tension spring to section (A) or (B) of the tension spring holder.

Note: If the tension is changed greatly (2 g-cm or more) in this adjustment, readjust the tension pole position and tension. (If the above specifications are not satisfied, the tension band or tension spring is faulty.)

3-4. SUPPLY GUIDE ROLLER (2) HEIGHT ADJUSTMENT (Figs. 3-7, 3-8, 3-9)

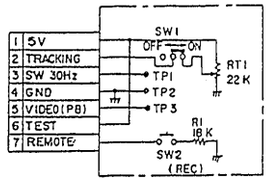
Be sure to check and adjust the height of supply guide roller (2) after reinstalling it.

Note: The supply guide roller (2) is specified as a service part while it is assembled with the guide roller base. Since it is coarsely adjusted before the unit is shipped from the factory, do not adjust its height unnecessarily.

PURPOSE : To set height relative to the cylinder.		*FAULT DUE TO INCOMPLETE ADJUSTMENT*: The play back picture distorted.	
TEST EQUIPMENT/JIG	*STATE OF VCR*	*TEST POINT*	*ADJUSTMENT POINT*
- Blank Tape - Alignment Tape - Oscilloscope - ATF Jig	Connect the ATF jig to CN612 on the main circuit board. (SW1:OFF)	TP1 (SW30) ATF TP2 (GND) ATF TP3 (FM OUT) ATF CN612 MAIN	

ADJUSTMENT PROCEDURE:

1) Load a blank tape and set the unit to the play mode.
2) Check that no curling or creasing of tape occurs around supply guide roller (2). If curling or creasing occurs, turn the top of supply guide roller (2) using a flat-bladed screwdriver, etc. to fine adjust its height. (Fig. 3-9)
3) Connect an oscilloscope to TP3 on the ATF jig. (Fig. 3-7)
4) Trigger the oscilloscope with TP1 (SW30) on the ATF jig.
5) Load the alignment tape which was fully rewound and set the unit to the forward search mode.
6) Turn the top of supply guide roller (2) using a flat-bladed screwdriver, etc. to lower it until the rhombic FM waveform becomes unshaped. (Fig. 3-8) If the FM waveform dose not becomes unshaped when supply guide roller (2) is turned by over 360°, return supply guide roller (2) to its original height to complete this adjustment.
7) Turn the top of supply guide roller (2) in the opposite direction to that in step 6) so the rhombic FM waveform is shaped.



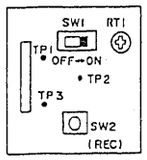


Fig. 3-7

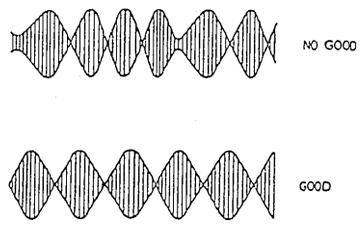


Fig. 3-8

3-5. TAKE-UP GUIDE POLE/TAKE-UP GUIDE POST HEIGHT ADJUSTMENT (Figs. 3-9, 3-10)

Be sure to perform this adjustment after reinstalling the take-up guide pole and capstan motor.

Note: The take-up guide post is specified as a service part while it is assembled with the it base. Since it is coarsely adjusted before the unit is shipped from the factory, do not adjust its height unnecessarily.

PURPOSE : To set height relative to the cylinder.		*FAULT DUE TO INCOMPLETE ADJUSTMENT*: The play back picture distorted.	
TEST EQUIPMENT/JIG	*STATE OF VCR*	*TEST POINT*	*ADJUSTMENT POINT*
- Blank Tape			

ADJUSTMENT PROCEDURE:

1) Load a blank tape and set the unit to the play mode.
2) Adjust screw (A) on the capstan motor so the tape travels at the center of the middle pole. Check that no curling or creasing occurs around the take-up guide post.
   If curling or creasing occurs, turn the top of the take-up guide post using a special driver to fine adjust its height. (Figs. 3-9, 3-10)
3) Turn the top of the take-up guide pole using a special driver to adjust its height so the tape travels at the center of the take-up guide pole.
4) Repeat reverse search and play and turn screw (B) on the take-up guide pole arm to adjust the inclination of the take-up guide pole so the variations in the height of tape are within the upper and lower flanges of the take-up guide pole.
5) Adjust screw (A) on the capstan motor so the tape travels at the center of the middle pole during play.
   Be careful that the tension of tape between the take-up guide roller and middle pole is not too high (the tape should be slightly slack).
6) Turn the top of the take-up guide pole using a special driver to adjust its height so the tape travels at the center of the take-up guide pole during play.
7) Load a blank tape which was fully rewound and set the unit to the play mode. Turn the top of the take-up guide post using a special driver to lower it so that curling occurs at the lower flange of the take-up guide post.
8) Turn the top of the take-up guide post in the opposite direction to that in step 7) so that no curling occurs.

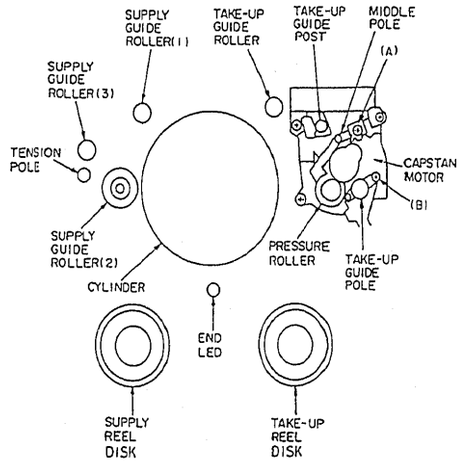


Fig. 3-9

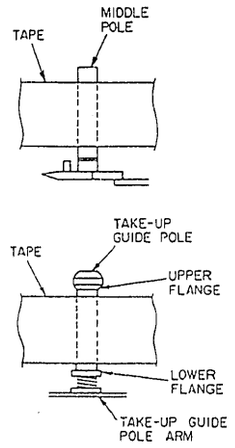


Fig. 3-10

3-6. SUPPLY GUIDE ROLLER (1)/TAKE-UP GUIDE ROLLER HEIGHT ADJUSTMENT (Figs. 3-7, 3-9, 3-11)

Be sure to perform this adjustment after reinstalling the supply guide roller (1) and take-up guide roller.

Note: The supply guide roller (1) and take-up guide roller are specified as service parts while they are assembled with their guide roller bases. Since they are coarsely adjusted before the unit is shipped from the factory, do not adjust their heights unnecessarily.

PURPOSE : To set height relative to the cylinder.		*FAULT DUE TO INCOMPLETE ADJUSTMENT*: The play back picture distorted.	
TEST EQUIPMENT/JIG	*STATE OF VCR*	*TEST POINT*	*ADJUSTMENT POINT*
- Blank Tape - Alignment Tape - Oscilloscope - ATF Jig	Connect the ATF jig to CN612 on the main circuit board. (SW1: OFF, RT1: its mechanical center.)	- TP1 (SW30) ATF - TP2 (GND) ATF - TP3 (FM OUT) ATF - CN612 MAIN	

ADJUSTMENT PROCEDURE:

1) Load a blank tape and set the unit to the play mode.
2) Check that no curling or creasing of tape occurs around supply guide roller (1) and the take-up guide roller.
   If curling or creasing occurs, turn the tops of supply guide roller (1) and the take-up guide roller using a special driver to fine adjust their heights. (Fig. 3-9)
3) Connect an oscilloscope to TP3 on the ATF jig. (Fig. 3-7)
4) Trigger the oscilloscope with TP1 (SW30) on the ATF jig.
5) Load the alignment tape which was fully rewound and set the unit to the play mode.
6) Check that the FM output waveform at TP3 is flat. Set SW1 on the ATF jig to ON and turn RT1 to the left and right to check that the FM output level drops at an equal angle on the left and right. (Fig. 3-11)
7) If the specification in step 6) cannot be confirmed, turn the tops of supply guide roller (1) and the take-up guide roller using a special driver to adjust their heights so the specification in step 6) can be satisfied.

Note: To adjust the height of the supply guide roller (1), loosen the hexagonal screw holding the supply guide roller (1) on the supply guide roller (1) base.

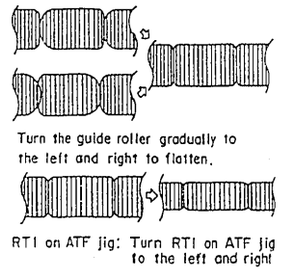


Fig. 3-11

4. ADJUSTMENT AFTER REPLACING THE CYLINDER (Figs. 3-7, 3-12)

When the cylinder is replaced, the height relative to the guide roller drifts, therefore the tape transport system should be adjusted.
Check and adjust in the following order.

PURPOSE : To set the relative height of the guide rollers.		*FAULT DUE TO INCOMPLETE ADJUSTMENT*: The played back picture is distorted.	
TEST EQUIPMENT/JIG	*STATE OF VCR*	*TEST POINT*	*ADJUSTMENT POINT*
- Blank Tape - Alignment Tape - Oscilloscope - ATF Jig	Connect the ATF jig to CN612 on the main circuit board . (SW1: off, RT1: its mechanical center.)	- TP1 (SW30) ATF - TP2 (GND) ATF - TP3 (FM OUT) ATF - CN612 Main	

ADJUSTMENT PROCEDURE:

1) Load a blank tape and set the unit to the play mode.
2) Check that no curling or creasing of the tape occurs around the guide rollers. If curling or creasing of the tape occurs, fine adjust the height of the guide rollers.
3) Load an alignment tape and set the unit to the play mode.
4) Connect an oscilloscope to TP3 on the ATF jig. (Fig. 3-7)
5) Trigger the oscilloscope with TP1 (SW30) on the ATF jig.
6) Adjust voltage level control on the oscilloscope to set the maximum amplitude of the FM output to 4 graduations. (Fig. 3-12)
   Check that the FM output is flat at this time. Set SW1 on the ATF jig to ON and adjust RT1 to set the maximum amplitude of the FM output to 3 graduations. Check that the minimum amplitude is set to 1.8 graduations or more.
7) If the specifications in step 6) cannot be confirmed, adjust the heights of the supply and take-up guide rollers so the specifications are satisfied.
8) Perform the following electrical adjustments referring to CHAPTER 4.
   - Setting the Head Switching Point
   - Playback Luminance Signal Level Adjustment
   - Record Luminance Signal Level Adjustment
   - Record Chroma Signal Level Adjustment

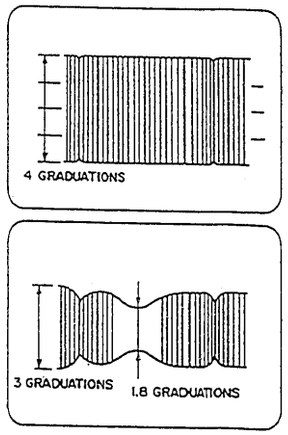


Fig. 3-12

5. CHECKING THE TORQUE

There are two (2) types of the cassette torque meter. Choose the one applicable for measurement to be performed.

- SRK-8T-132: Can measure torques other then the tension torque.
- SRK-8T-112: Can measure only the tension and play torques.

I T E M	*VCR MODE*	*MEASURED REEL DISK*	*TORQUE VALUE*	*TORQUE CASSETTE USED*
Take-up Torque	Play	Take-up	7 ~ 11 g-cm	SRK-8T-112
Rewind Torque	Reverse search to stop	Supply	20 ~ 34 g-cm	SRK-8T-132
Take-up Brake Torque	Reverse search to stop	Take-up	More than 10 g-cm	SRK-8T-112

CHAPTER 4
ELECTRICAL ADJUSTMENT

Note 1: Perform the camera adjustment using a personal computer (except the following items). For there adjustments (using a personal computer), you need not separate the camera and VCR (open the cases).
- Subcarrier Frequency Confirmation
- Sensor Drive Pulse Frequency Confirmation
- Sensor Sub Voltage Adjustment
- Backfocus Adjustment

Note 2: The digital adjustment program for the camera is called the MAP (Manual Adjustment Program).
Note 3: DSP is an abbreviation for the digital signal processor.

1. CONNECTION FOR ADJUSTMENT

Remove the components, etc. listed below first, referring to CHAPTER 2 DISASSEMBLY. (See Fig. 4-1)

ORDER FOR REMOVING PARTS	*ITEM No.*
- MIC	3-1-1
- Separating the Camera Section and VCR Section	3-1-2
- EVF	3-2-1
- Process Circuit Board, Sensor Circuit Board, Lens Block	3-2-2

Note 1: When the EVF is removed, no operation mode is displayed on the monitor screen. Use an extension cable to connect the EVF to display operation modes on the monitor screen.
Note 2: Remove the above components form the left case and reassemble them so that the adjustments can be performed.

2. CAMERA SECTION ADJUSTMENT

2-1. CIRCUIT BOARD LOCATIONS AND ADJUSTMENT SERVICE POSITION

1. Process Circuit Board
2. Sensor Circuit Board
3. Focus Sensor Circuit Board
4. Autofocus Circuit Board

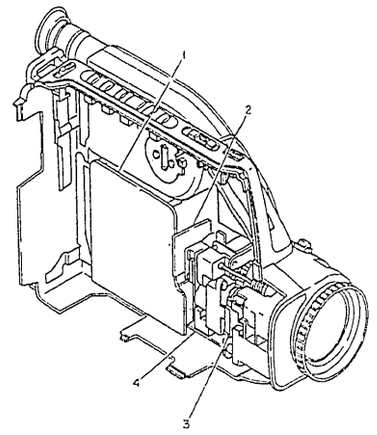


Fig. 4-2

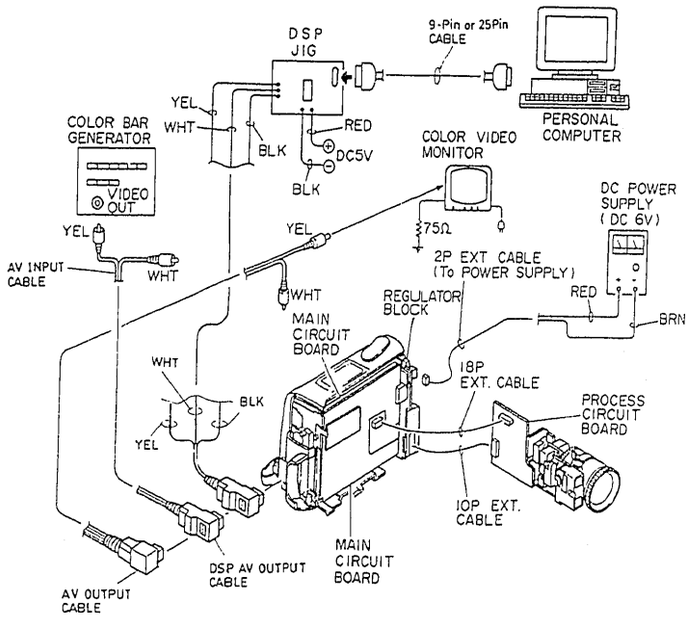


Fig. 4-1

2-2. TEST EQUIPMENT AND CHARTS NECESSARY FOR ADJUSTMENT

- Test Equipment
  - Oscilloscope (dual trace)
    (Vectorscope)
  - Digital Voltmeter (DVM)
  - Frequency Counter
  - Color Video Monitor
- Charts, etc.
  - Camera Adj. Floppy Disk
  - Personal Computer
  - Personal Computer 9-pin or 25-pin Cable
  - DSP Jig
  - Gray Scale Chart
  - Color Bar Chart
  - Resolution Chart
  - Backfocus Adjustment Chart
  - Backfocus Adjustment Driver
  - Light Box (3100°K)
  - Light Balancing Filter C12
  - DC Power Supply (DC6V/3A)
  - DC Power Supply (DC5V/1A)

2-3. ADJUSTMENT CONDITION

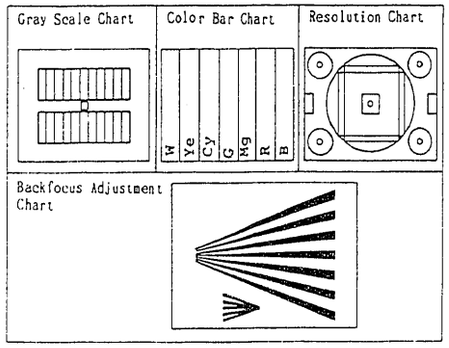
1) Check that the VCR section has been adjusted correctly before adjusting the camera section
2) Use a light box with minimum flickering. Control the color temperature of the light box strictly.
3) Connect this unit, a power supply and a color video monitor as shown in Fig. 4-1.
4) When using the video out(AV OUT) to perform adjustment, be sure to terminate the AV OUT jack with 75 ohms.
5) Place the chart (light box) 40cm away from the camera (lens surface) when otherwise not specified.
6) Point the camera at the chart to fill the video period when otherwise not specified.
7) Use the 10:1 probe of the oscilloscope when other not specified.
8) When "Trigger the oscilloscope internally" is specified, set the time base of the oscilloscope to 10μs/div.

2-4. PRESET POSITION OF SWITCHES AND CONTROLS DURING ADJUSTMENT

- POWER switch ..... "CAM" position
- POWER SAVE/NORMAL .... "NORMAL" Switch position
- ZOOM MODE ..... "ZM:1"
- FULL AUTO switch ..... "MAN" position
- TITLE ..... Not Display mode
- FOCUS ..... "FOCUS M"
- SHUTTER ..... "S:60"(1/60 sec)
- DATE ..... Not Display mode

2-5. LIST OF CHARTS FOR CAMERA ADJUSTMENT

Table 4-1



2-6. ADJUSTMENTS AFTER REPLACING MAJOR COMPONENTS IN THE CAMERA BLOCK

After replacing major components, perform adjustments, referring to the table below. The following table shows the minimum adjustments required after major components are replaced.
The table below may not apply when several components are replaced, depending on the symptom of the defect.

Caution : When EEP ROM or the process circuit board is replaced, initialize the EEP ROM, referring to "2-8-3 Initial Setting by Model", then perform all the digital adjustments.

ITEM	NAME OF ADJUSTMENT	NAME OF MAJOR COMPONENTS					
		SENSOR P.C.B	PROCESS P.C.B	IC1001	IC1002 IC1003	IC1201	IC1202
CAMERA ANALOGUE ADJUSTMENT							
(1)	Sub Carrier Frequency Confirmation		●				
(2)	Sensor Drive Pulse Frequency Confirmation		●				
(3)	Sensor Sub Voltage Adjustment	●		●			
(4)	Backfocus Adjustment	●		●			
CAMERA DIGITAL ADJUSTMENT							
(1)	Auto Iris Control Adjustment	●	●	●	●		●
(2)	Iris Calibration Adjustment	●	●	●	●		●
(3)	Blue Matrix Adjustment	●	●	●			●
(4)	White Balance Adjustment	●	●	●			●
(5)	Chroma Gain Adjustment	●	●	●			●

ITEM	NAME OF ADJUSTMENT	NAME OF MAJOR COMPONENTS					
		IC1203	IC1204	IC1213			
CAMERA ANALOGUE ADJUSTMENT							
(1)	Sub Carrier Frequency Confirmation			●			
(2)	Sensor Drive Pulse Frequency Confirmation	●		●			
(3)	Sensor Sub Voltage Adjustment						
(4)	Backfocus Adjustment						
CAMERA DIGITAL ADJUSTMENT							
(1)	Auto Iris Control Adjustment		●				
(2)	Iris Calibration Adjustment		●				
(3)	Blue Matrix Adjustment		●				
(4)	White Balance Adjustment		●				
(5)	Chroma Gain Adjustment		●				

2-7. CAMERA ANALOGUE ADJUSTMENT

(1) Subcarrier Frequency Confirmation (Fig. 4-6)

PURPOSE	To set the subcarrier frequency to the specified value.			
INCOMPLETED PHENOMENON	No color appears.			
TEST POINTS	*ADJUST POINTS*	*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
·TP1203 PC ·JK001-9 (AV JACK:GND)	·CT1203 PC (Fo ADJ)		·Frequency Counter	14.318180MHz ± 80Hz

Note: Basically, it is not necessary to adjust the subcarrier frequency. Be sure to check the frequency before adjustment, and adjust to only when it is drifted.
1) Connect the frequency counter to TP1203.
2) Confirm that the frequency is 14.318180MHz ± 80Hz.
   If the frequency is drifted, adjust CT1203 on the process circuit board for 14.318180MHz ± 80Hz.
Note: Be careful when applying an adjustment driver to CT1203 because the stray capacitance the driver may vary.

(2) Sensor Drive Pulse Frequency Confirmation (Fig. 4-6)

PURPOSE	To synchronize the sensor drive frequency with the horizontal sync signal.			
INCOMPLETED PHENOMENON	The picture is distorted.			
TEST POINTS	*ADJUST POINTS*	*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
·TP1201 PC ·JK001-9 (AV JACK GND)	·CT1204 PC (SENSOR DRIVE Fo)		·DVM	2.5V ± 0.1V

Note: Basically, it is not necessary to adjust the sensor drive pulse frequency. Be sure to check the voltage before adjustment, and adjust to only when it is drifted.
1) Connect the DVM to TP1201.
2) Confirm that the voltage is 2.5V ± 0.1V.
   If the voltage is drifted, adjust CT1204 for 2.5V ± 0.1V.
Note: Be careful when applying an adjustment driver to CT1204 because the stray capacitance the driver may vary.

(3) Sensor Sub Voltage Adjustment (Figs. 4-3, 4-5)

PURPOSE	To suppress blooming.			
INCOMPLETED PHENOMENON	When a very bright subject is shot, a band of light (blooming) occurs at the top and bottom of the subject.			
TEST POINTS	*ADJUST POINTS*	*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
	·RT1001-1 SP (SENSOR SUB VOLTAGE)	Point the camera at a 40W to 60W incandescent lump 1 meter away.	·Color Video Monitor	

1) Adjust RT1001-1 so that the band of blooming appearing in the vertical direction of the monitor screen just disappears.
Note: Stop RT1001-1 where blooming disappears and be careful not to turn it too for. Check that no roughness is present in the very bright section of the lamp.

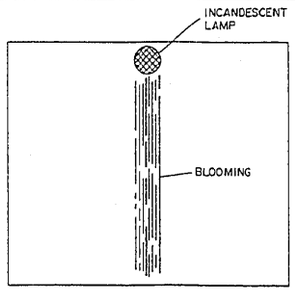


Fig. 4-3

(4) Backfocus Adjustment (Fig. 4-4)

PURPOSE	·The purpose of this adjustment is to ensure proper focus tracking throughout the zoom range.			
INCOMPLETED PHENOMENON	·The actual distance to the subject does not match the distance mark on the focus ring. ·When the camera is pointed at the same subject, the distance mark is different when zoom is set to the telephoto and wide-angle ends.			
TEST POINTS	*ADJUST POINTS*	*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
	Relay Lens	Position the camera section 2 meters from the backfocus chart and illuminated the object with approx. 100 lux.	·Backfocus Adj. Driver ·Backfocus Adj. Chart ·Color Video Monitor	Same value between real distance and index on the ring.

1) Set the zoom to wide-angle and set the index on the focus ring to two (2) meters.
2) Loosen the relay lens lock screw.
3) Insert the backfocus adjustment driver into the backfocus adjustment point and turn it to the left and right to optimize the focus.
4) Set the zoom to telephoto end and confirm that the chart is in focus.
   If it is not focused, set the zoom to wide-angle and readjust step 3.
5) Confirm that the chart is approximately in focus at the both the wide-angle and telephoto ends with the focus ring set to two (2) meters.

Note: Adjust without assembling into the left case. After adjustment is completed, tighten the relay lens lock screw with the backfocus adjustment driver inserted into the adjustment point (holding the backfocus driver by hand) so that the adjusted position will not drift.

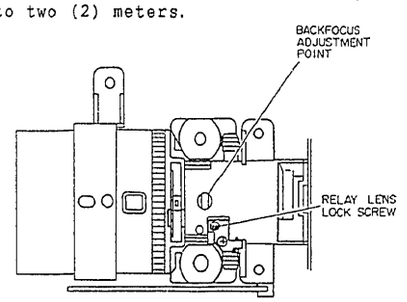


Fig. 4-4

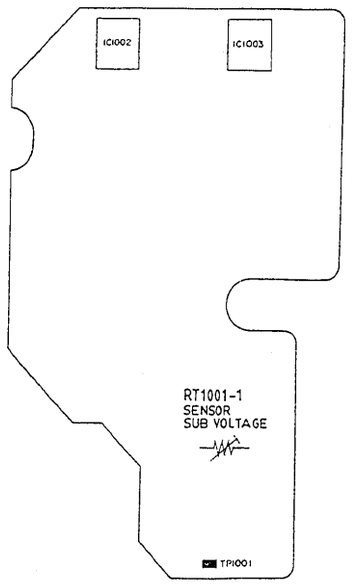


Fig. 4-5 Sensor (SP) Circuit Board (Side-A)

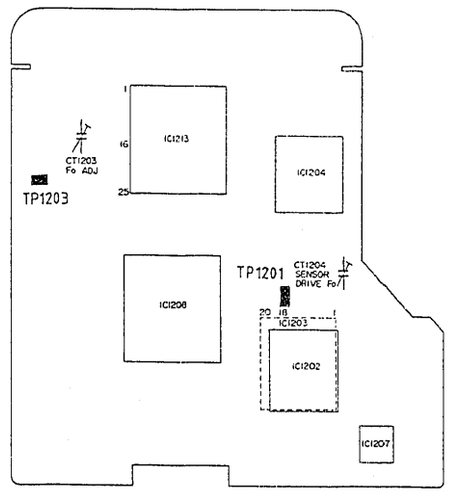


Fig. 4-6 Process (PC) Circuit Board (Side-A)

2-8. CAMERA DIGITAL ADJUSTMENT

Note 1: The digital adjustment program for camera is called the MAP (Manual Adjustment Program).

Note 2: To completed adjustment, press the [ESC] (escape) key twice to restore off the camera recorder and jig.

2-8-1. How to Start the Adjustment Program (MAP)

Connect the camera/recorder, DSP jig, personal compute, power supply, etc. as shown in Fig. 4-1.

Note 1: Check that the camera/recorder is turned on.

Note 2: The following describes an example of the instructions of the personal computer and the menu display; they are different depending on the personal computer manufacturer and model. Refer to the instruction manual of personal computer.

1) Turn the personal computer on and start the MS-DOS system. (Fig. 4-7)

Note 3: Refer to the instruction manual of the personal computer for how to start the computer.

2) Load the camera adjustment floppy disk into disk drive B and press [B] [:] then [ENTER] . (B may be small letter.) (Fig. 4-8)

Note 4: If the camera adjustment floppy disk is loaded into disk drive A, press [A] [:] then [ENTER] .

3) Press [M] [A] [P] [_] [I] [B] [M] [(SPACE)] [1] then [ENTER] (MAP and IBM may be small letters).
The digital adjustment program (MAP: Manual Adjustment Program) starts and the MAIN MENU shown Fig. 4-10 appears. (Figs. 4-9, 4-10)

Note: When you use a personal computer with two serial interface connectors and connect the DSP jig to serial interface connector 2, press MAP_IBM 2

4) Select INITIALIZE EEPROM or ADJUSTMENT. If [ESC] (escape) is pressed, the display before the MAP starts (MS-DOS) is restored. Refer to "2-8-3. Initial Setting by Model" for INITIALIZE EEPROM. Refer to "2-8-4. Digital Adjustment Procedure" for ADJUSTMENT.

Note 5: Refer to "2-8-5. Error Messages" if an error massage is displayed.

```
F>
```
Fig. 4-7

↓

LOAD THE CAMERA ADJ. FLOPPY DISK IN TO DISK DRIVE B

↓

Press [B] [:] [ENTER]

↓

```
F>B:
B>
```
Fig. 4-8

↓

Press [M] [A] [P] [_] [I] [B] [M] [(SPACE)] [1] [ENTER]

↓

```
F>B:
B>MAP_IBM 1
```
Fig. 4-9

↓

MAIN MENU

```
****************************************
************* MAIN MENU *************
****************************************

          [A]    INITIALIZE

          [B]    ADJUSTMENT

          [ESC]  END

   Please select [A] or [B] or [ESC]
```
Fig. 4-10

2-8-2. Initial Setting by Model

Note 1: This item describes how to initialize the EEP ROM. Be sure to perform this item after replacing EEP ROM or the process circuit board.
When other components are replaced, normally, it is not necessary to initialize the EEP ROM.
Press [ESC] (escape) to return the computer's display to MAIN MENU.

1) Start the MAP, referring to "2-8-2. How to Start the Adjustment Program (MAP)".
2) Press [A] to select INITIALIZE. (Figs. 4-11, 4-12)
3) Select the number according to the model. (Fig. 4-12)

Note 2: If you select number without a model name by mistake, the message shown in Fig. 4-15 will appear in the computer's display. Press any key to return the display to Fig. 4-12 (INITIALIZE MENU).

Note 3: If there are more than 5 models and [P] is pressed, the computer's display changes to the next page.

Note 4: If [ESC] (escape) is pressed, the computer's display returns to Fig. 4-11 (MAIN MENU).

4) If there are no abnormalities in the camera/recorder, the message shown in Fig. 4-13 is displayed in the computer's display for a while, and then the message informing you that the initial setting has been completed (shown in Fig. 4-14) is displayed.
5) If the message shown in Fig. 4-14 appears in the computer's display, press any key. The computer's display returns to Fig. 4-12 (INITIALIZE MENU).
6) Now, the initial setting of the EEP ROM has been completed. Press [ESC] (escape)to return the computer's display to Fig. 4-11 (MAIN MENU). Perform all digital adjustments, referring to "2-8-4. Digital Adjustment Procedure".

Note 5: If an error message appears in the computer's display, refer to "2-8-5. Error Massages".
If a key is pressed after the error message appears, the computer's display returns to the INITIALIZE MENU (Fig. 4-12)

MAIN MENU

```
****************************************
************* MAIN MENU *************
****************************************

          [A]    INITIALIZE

          [B]    ADJUSTMENT

          [ESC]  END

   Please select [A] or [B] or [ESC]
```
Fig. 4-11

↓

Press [A]

↓

INITIALIZE MENU

```
****************************************
************ INITIALIZE *************
****************************************

      [1]      VM-4400A
      [2]      VM-E25A (1)
      [3]      VM-E25A (2)
      [4]      VM-E23A
      [5]      XXXXXX
      [P]      NEXT SELECTION
      [ESC]    RETURN TO MAIN MENU

   Please select the type of set
   Hit [1] - [5] or [P] or [ESC]
```
Fig. 4-12

↓

Press [4]

↓

```
NOW INITIAL SETTING !!
Please wait a moment
```
Fig. 4-13

↓

```
COMPLETED INITIAL SETTING !!
**** HIT ANY KEY ****
```
Fig. 4-14

↓

Press any key to return to Fig. 4-12

↓

Press [ESC] to return to Fig. 4-11

MESSAGE WHEN OPERATED BY MISTAKE

```
Can not find the DATA FILE
**** HIT ANY KEY ****
```
Fig. 4-15

ERROR MESSAGE

```
CAN'T WRITE TO EEPROM
Check the wiring or change the EEPROM
**** HIT ANY KEY ****
```
Fig. 4-16

2-8-3. Digital Adjustment Procedure

Note 1: When EEP ROM or the process circuit board is replaced, initialize the EEP ROM, referring to "2-8-3. Initial Setting By Model" then perform all the digital adjustment.

Note 2: When an error message appears during adjustment, refer to "2-8-5. Error Messages". If a key is pressed after an error massage appears, the ADJUSTMENT MENU restored.

1) Start the MAP, referring to "2-8-2. How to Start the Adjustment Program (MAP)"
2) Press [B] to select ADJUSTMENT. (Figs. 4-21, 4-22)
3) Select the number of the required adjustment.

Note 3: If [ESC] (escape) is pressed, the computer's display returns to Fig. 4-21 (MAIN MENU).

Note 4: To complete adjustment, press the ESC (escape) key twice to restore the MS-DOS screen and then turn off the camera recorder and jigs.

(1) Auto Iris Control Adjustment (Figs. 4-23 - 4-27)

Note: This adjustment is performed automatically, When the auto iris control adjustment is specified, the personal computer adjusts it automatically.

PROPOSE	To set the brightness of picture.
INCOMPLETED PHENOMENON	·A block subject with low illumination is raised. ·A black subject with low illumination is depressed.
EQUIPMENT/JIG	(Oscilloscope)
CONDITION	Point at a light box without a chart inserted.
PROCEDURE	

1) Press [1] to select the auto iris control adjustment. (Fig. 4-24)
2) If there is no abnormality in the camera/recorder, the message shown in Fig. 4-25 is displayed in the computer's display for a while, and then message shown in Fig. 4-26 appears.
3) After the computer's display changes from Fig. 4-26 to Fig. 4-27, press any key to return the display to Fig. 4-24.
   Now, the auto iris control adjustment is complete.

Check: Connect an oscilloscope to the video output (AV OUT) and check that the waveform level is 514mV ± 70mV. (Fig. 4-23)

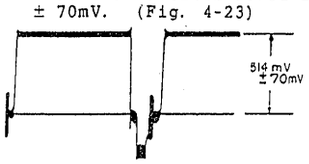


Fig. 4-23

MAIN MENU

```
**************************************
************** MAIN MENU **************
**************************************

          [A]    INITIALIZE

          [B]    ADJUSTMENT

          [ESC]  END

   Please select [A] or [B] or [ESC]
```

Fig. 4-21

↓ Press [B]

ADJUSTMENT MENU

```
**************************************
************ ADJUSTMENT **************
**************************************

        [1]   AUTO IRIS CONTROL
        [2]   IRIS CALIBRATION
        [3]   BLUE MATRIX
        [4]   WHITE BALANCE
        [5]   CHROMA GAIN
        [ESC] RETURN TO MAIN MENU

   Please select [1] - [5] or [ESC]
```

Fig. 4-22

ADJUSTMENT MENU

```
**************************************
************ ADJUSTMENT **************
**************************************

        [1]   AUTO IRIS CONTROL
        [2]   IRIS CALIBRATION
        [3]   BLUE MATRIX
        [4]   WHITE BALANCE
        [5]   CHROMA GAIN
        [ESC] RETURN TO MAIN MENU

   Please select [1] - [5] or [ESC]
```

Fig. 4-24

↓ Press [1]

```
AUTO IRIS CONTROL ADJUSTING
Please wait a moment
```

Fig. 4-25

↓

```
VIDEO LEVEL DATA WRITING TO EEPROM
```

Fig. 4-26

↓

```
COMPLETED WRITING EEPROM
**** HIT ANY KEY ****
```

Fig. 4-27

↓ Press any key

↓ Returns to ADJUSTMENT MENU (Fig. 4-24)

(2) Iris Calibration Adjustment (Figs. 4-28 - 4-31)

Note: This adjustment is performed automatically. When the Iris Calibration Adjustment is specified, the personal computer adjusts it automatically

PROPOSE	To detect the F number correctly.
INCOMPLETED PHENOMENON	·The iris operation becomes unstable. ·AGC, program AE and Auto white does not operate normally.
EQUIPMENT/JIG	———
CONDITION	·Attach a C12 filter. ·Point the camera at the light box without a chart to fill the screen (at wide-angle).
PROCEDURE	

1) Press [2] to select the iris calibration adjustment. (Fig. 4-28)
2) If there is no abnormality in the camera/recorder, the massage shown in Figs. 4-29 and 4-30 are displayed in the computer's display for a while, and then the message shown in Fig. 4-31 appears.
3) Now, the iris calibration adjustment is complete.
   Press any key to return the computer's display to Fig. 4-28.

(3) Blue Matrix Adjustment (Figs. 4-32 - 4-36)

PROPOSE	To compensate for uneveness in the chroma signal.
INCOMPLETED PHENOMENON	Color reproduction becomes defective.
EQUIPMENT/JIG	Oscilloscope
CONDITION	Point at a color bar chart.
PROCEDURE	

1) Press [3] to select the blue matrix adjustment. (Fig. 4-33)
2) Connect an oscilloscope to the video output (AV OUT).
3) Press the [D] key to minimize the yellow amplitude, and then press the [U] key to adjust the yellow amplitude so its ration to the blue amplitude is 1:3.
4) Press the [ENTER] key to write data to EEP ROM and then press any key to return the computer's display to Fig. 4-33.

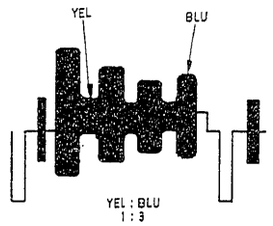


Fig. 4-32

ADJUSTMENT MENU

```
**************************************
************ ADJUSTMENT **************
**************************************

        [1]   AUTO IRIS CONTROL
        [2]   IRIS CALIBRATION
        [3]   BLUE MATRIX
        [4]   WHITE BALANCE
        [5]   CHROMA GAIN

        [ESC] RETURN TO MAIN MENU

   Please select [1] - [5] or [ESC]
```

Fig. 4-28

↓ Press [2]

```
IRIS CALIBRATION ADJUSTING
Please wait a moment
```

Fig. 4-29

↓

```
HALL DATA WRITING TO EEPROM
```

Fig. 4-30

↓

```
COMPLETED WRITING EEPROM
**** HIT ANY KEY ****
```

Fig. 4-31

↓ Press any key

↓ Return to ADJUSTMENT MENU (Fig. 4-28)

ADJUSTMENT MENU

```
**************************************
************ ADJUSTMENT **************
**************************************

        [1]   AUTO IRIS CONTROL
        [2]   IRIS CALIBRATION
        [3]   BLUE MATRIX
        [4]   WHITE BALANCE
        [5]   CHROMA GAIN
        [ESC] RETURN TO MAIN MENU

   Please select [1] - [5] or [ESC]
```

Fig. 4-33

↓ Press [3]

```
BLUE MATRIX ADJUST MODE SETTING
Please wait a moment
```

Fig. 4-34

↓

```
BLUE MATRIX ADJUSTMENT
[U]       UP
[D]       DOWN
[ENTER]   RETURN TO MENU
```

Fig. 4-35

↓ Press [ENTER]

```
BLUE MATRIX DATA WRITING TO EEPROM
```

Fig. 4-35-1

↓

```
COMPLETED WRITING EEPROM
**** HIT ANY KEY ****
```

Fig. 4-36

↓ Press any key, return to ADJUSTMENT MENU (Fig. 4-33)

(4) White Balance Adjustment
(Figs. 4-37 - 4-43)

PROPOSE	To set white balance under the color termperature which becomes a reference for the auto white balance circuit.
INCOMPLETED PHENOMENON	·Color of the subject is different from that of the picture. ·A white subject is not seen as white.
EQUIPMENT/JIG	·Oscilloscope (Vectorscope)
CONDITION	·Attach a C12 filter. ·Point at a gray scale chart.
PROCEDURE	

1) Press [4] to select the white balance adjustment. (Fig. 4-39)

When using an oscilloscope (Fig. 4-37)
2) Connect an oscilloscope to the video output (AV OUT).
3) Press the [U], [D], [L] and [R] keys to minimize carrier components in the waveform. (Fig. 4-41)
4) After minimizing the carrier components, press the [U] key 10 times.
5) Press the [ENTER] key to write data to the EEP ROM and then press any key to return the computer's display to Fig. 4-39.

When using a vectorscope (Fig. 4-38)
2) Connect a vectorscope terminated with 75 ohms to the video output (AV OUT).
3) Press the [U], [D], [L] and [R] keys so the bright spot comes to the center of the vectorscope. (Fig. 4-41)
4) After centering the bright spot, press the [U] key 10 times.
5) Press the [ENTER] key to write data to the EEP ROM and then press any key to return the computer's display to Fig. 4-39.

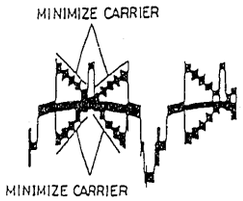


Fig. 4-37

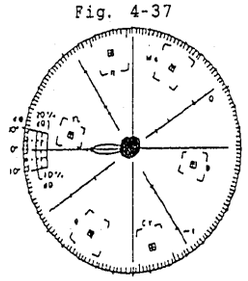


Fig. 4-38

ADJUSTMENT MENU

```
****************************************
************ ADJUSTMENT *************
****************************************

        [1]   AUTO IRIS CONTROL
        [2]   IRIS CALIBRATION
        [3]   BLUE MATRIX
        [4]   WHITE BALANCE
        [5]   CHROMA GAIN
        [ESC] RETURN TO MAIN MENU

   Please select [1] - [5] or [ESC]
```

Fig. 4-39

↓ Press [4] ↓

```
WHITE BALANCE ADJUST MODE SETTING

Please wait a moment
```

Fig. 4-40

↓

```
WHITE BALANCE ADJUSTMENT

[U]       RED-GAIN UP
[D]       RED-GAIN DOWN
[R]       BLUE-GAIN UP
[L]       BLUE-GAIN DOWN
[ENTER]   RETURN TO MENU
```

Fig. 4-41

↓ Press [ENTER] ↓

```
WHITE BALANCE DATA WRITING TO EEPROM
```

Fig. 4-42

↓

```
COMPLETED WRITING EEPROM

**** HIT ANY KEY ****
```

Fig. 4-43

↓ Press any key ↓

Return to ADJUSTMENT MENU (Fig. 4-39)

(5) Chroma Gain Adjustment
(Figs. 4-44 - 4-50)

PROPOSE	To set the color saturation under the reference color temperature.
INCOMPLETED PHENOMENON	·Color of the picture is denser than that of the subject. ·Color of the picture is lighter that of the subject.
EQUIPMENT/JIG	·Oscilloscope (Vectorscope)
CONDITION	·Attach a C12 filter. ·Point at a color bar chart
PROCEDURE	

1) Press [5] to select the chroma gain adjustment. (Fig. 4-46)

When using an oscilloscope (Fig. 4-44)
2) Connect an oscilloscope to the video output (AV OUT).
3) Press the [U] and [D] keys to set the red level to 440mV ± 30mV. (Fig. 4-48)
4) Press the [ENTER] key to write data to the EEP ROM and then press any key to return the computer's display to Fig. 4-46.

When using a vectorscope (Fig. 4-45)
2) Connect a vectorscope terminated with 75 ohms to the video output (AV OUT).
3) Press the [U] and [D] keys so the red vector is 155% ± 10%. (Fig. 4-48)
4) Press the [ENTER] key to write data to the EEP ROM and then press any key to return the computer's display to Fig. 4-46.

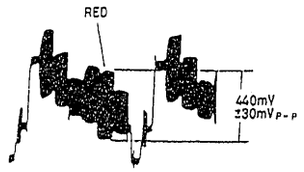


Fig. 4-44

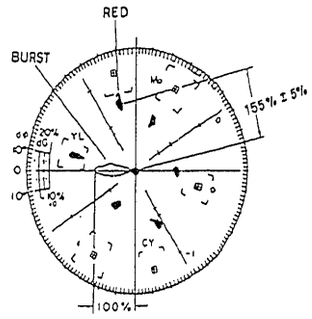


Fig. 4-45

ADJUSTMENT MENU

```
****************************************
************ ADJUSTMENT *************
****************************************

        [1]   AUTO IRIS CONTROL
        [2]   IRIS CALIBRATION
        [3]   BLUE MATRIX
        [4]   WHITE BALANCE
        [5]   CHROMA GAIN
        [ESC] RETURN TO MAIN MENU

   Please select [1] - [5] or [ESC]
```

Fig. 4-46

↓ Press [5] ↓

```
CHROMA GAIN ADJUST MODE SETTING

Please wait a moment
```

Fig. 4-47

↓

```
CHROMA GAIN ADJUSTMENT

[U]       UP
[D]       DOWN
[ENTER]   RETURN TO MENU
```

Fig. 4-48

↓ Press [ENTER] ↓

```
CHROMA GAIN DATA WRITING TO EEPROM
```

Fig. 4-49

↓

```
COMPLETED WRITING EEPROM

**** HIT ANY KEY ****
```

Fig. 4-50

↓ Press any key ↓

Return to ADJUSTMENT MENU (Fig. 4-46)

2-8-5. Error Messages

When an error massage is displayed during adjustment, press any key to return the computer's display to the initial setting or adjustment menu and then investigate the cause of the error.

(1) Error Message No. 1

```
ERROR !!
CAN'T WRITE TO EEPROM
Check the wiring or change the EEPROM
**** HIT ANY KEY ****
```

Fig. 4-61

(1) Error message displayed when EEP ROM is initialized and during whole adjustment.

Major Causes

1. EEP ROM is faulty.
2. DSP μP is faulty.
3. Data line between DSP μP and EEP ROM is faulty.
4. DSP jig is faulty.

(2) Error Message No. 2

```
ERROR !!
BAD LIGHT CONDITION !
**** HIT ANY KEY ****
```

Fig. 4-62

(2) Error massage displayed during auto iris control and iris calibration adjustments.

Countermeasures

1. Check that the brightness (also the color temperature) of the light box dose not decrease.
2. Adjust the number of color temperature conversion filters.

(3) Error Message No. 3

```
ERROR !!
IRIS HALL DEVICE BE DEFECTIVE
**** HIT ANY KEY ****
```

Fig. 4-63

(3) Error message displayed during auto iris control and iris calibration adjustments.

Major Causes

1. The connection of the iris block is faulty.
2. Iris block (Hall device) is faulty.

(4) Error Message No. 4

```
ERROR !!
MAY BE DEVICE ON THE SET IS BROKEN
**** HIT ANY KEY ****
```

Fig. 4-64

(4) Error message displayed during auto iris control and iris calibration adjustments.

Major Causes

1. Data line is faulty.
2. The video signal processor (including the VCR block) is faulty.
3. DSP jig is faulty.
4. Adjustment program (MAP) is faulty.

2-9. ELECTRONIC VIEWFINDER (EVF) ADJUSTMENT

(1) Deflection Yoke Position Adjustment (Fig. 4-71)

PURPOSE	This adjustment procedure eliminates picture tilt in the EVF display.			
TEST POINTS	*ADJUST POINTS*	*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
	·DEFLECTION YOKE	Aim the resolution chart.	·EVF Display	

1) Loosen the deflection yoke nut.
2) Turn the deflection yoke so that the EVF picture (chart) is horizontal, matching the edges of the CRT.

Note: After adjustment is completed, tighten the deflection yoke nut.

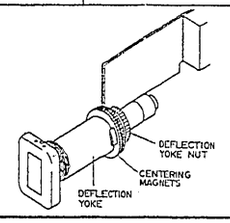


Fig. 4-71

(2) EVF Centering Adjustment (Fig. 4-71)

PURPOSE	This adjustment centers the image observed by the camera in the EVF display.			
TEST POINTS	*ADJUST POINTS*	*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
	·CENTERING MAGNETS	Aim the resolution chart.	·EVF Display	

1) Remove the locking paint from the centering magnet.
2) Adjust the centering magnets until the center of the picture viewed by the camera is positioned in the center of the EVF display.

(3) EVF Vertical Size Adjustment (Fig. 4-72)

PURPOSE	This adjustment determines the vertical size of the image appearing in the EVF display				
TEST POINTS	*ADJUST POINTS*		*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
	·RT802 (V. SIZE)	EVF	Aim the resolution chart.	·EVF Display	

1) Adjust RT802 so that the top and bottom edges of the chart match the top and edges of the CRT.

(4) EVF Brightness Adjustment (Fig. 4-72)

PURPOSE	This adjustment sets the brightness of the picture in the EVF display.				
TEST POINTS	*ADJUST POINTS*		*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
	·RT805 (BRIGHT)	EVF	Aim the resolution chart.	·EVF Display	

1) Adjust RT805 to optimize the EVF picture.

(5) EVF Focus Adjustment (Fig. 4-72)

PURPOSE	This control adjusts for optimum focus of the electronic viewfinder picture.				
TEST POINTS	*ADJUST POINTS*		*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
	·RT803 (FOCUS)	EVF	Aim the resolution chart.	·EVF Display	

1) Adjust RT803 so that the EVF picture is clear.

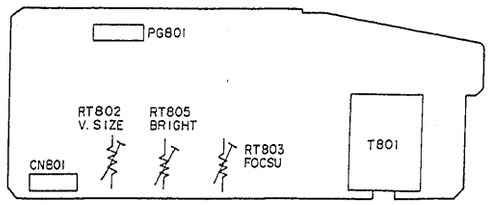


Fig. 4-72 Electrical Adjustment (EVF) Circuit Board (Parts Side)

2-10. AUTOFOCUS ADJUSTMENT

(1) Autofocus Sensor Position Adjustment (Fig. 4-81)

3. VCR SECTION ADJUSTMENT

3-1. CIRCUIT BOARD LOCATIONS AND SERVICING POSITION

5) After replacing the parts, check each adjustment. If you find the items

3-5. ADJUSTMENTS AFTER REPLACING MAJOR COMPONENTS IN THE VCR BLOCK

After replacing major components, perform adjustments, referring to the table below. The following table shows the minimum adjustments required after major components are placed.
The table below may not apply when several components are replaced, depending on the symptom of the defect.
Note: After replacing the parts, check each adjustment. If you find the items necessary to be adjusted, remove the corresponding laser trimming resistors and replace and them with variable resistors for adjustment.

ITEM	NAME OF ADJUSTMENT	NAME OF MAJOR COMPONENTS					
		MAIN C.B.A	CYLINDER ASSEMBLY	IC901	IC905	IC101	IC102
SYSTEM CONTROL CIRCUIT AND SERVO CIRCUIT							
(1)	Setting the Head Switching Point	●	●	●	●		
(2)	Setting the Power Shut Off Level	●	●	●	●		
LUMINANCE/CHROMA CIRCUIT							
(1)	AGC Adjustment					●	
(2)	Comb Filter Adjustment					●	
(3)	IR Adjustment					●	
(4)	Emphasis Input Level Adjustment					●	
(5)	Carrier Frequency Adjustment					●	
(6)	Deviation Adjustment					●	
(7)	Playback Luminance Signal Level Adjustment					●	
(8)	Record Luminance Signal Level Adjustment	●	●			●	
(9)	Record Chroma Signal Level Adjustment	●	●			●	●

ITEM	NAME OF ADJUSTMENT	NAME OF MAJOR COMPONENTS					
		IC105					
SYSTEM CONTROL CIRCUIT AND SERVO CIRCUIT							
(1)	Setting the Head Switching Point						
(2)	Setting the Power Shut Off Level						
LUMINANCE/CHROMA CIRCUIT							
(1)	AGC Adjustment						
(2)	Comb Filter Adjustment	●					
(3)	IR Adjustment						
(4)	Emphasis Input Level Adjustment	●					
(5)	Carrier Frequency Adjustment	●					
(6)	Deviation Adjustment	●					
(7)	Playback Luminance Signal Level Adjustment						
(8)	Record Luminance Signal Level Adjustment						
(9)	Record Chroma Signal Level Adjustment						

3-6. SYSTEM CONTROL CIRCUIT AND SERVO CIRCUIT

(1) Setting the Head Switching Point (Figs. 4-102, 4-151)

Note: Be sure to set the head switching point after replacing the cylinder and main circuit board (EA ROM).
The head switching point can be set automatically when the following steps performed.

TEST POINTS		ADJUST POINTS	CONDITION	EQUIPMENT/JIG	SPECIFICATION
·TP1 (SW30) ·VIDEO OUT (AV OUT) ·CN612	ATF MAIN			·ATF Jig ·Alignment Tape ·Oscilloscope	6H ± 1.5H

SETTING
1) Load an alignment tape. After checking that loading is complete, disconnect the power supply.
2) Connect the ATF jig to CN612 on the main circuit board. (Set SW1 on the ATF jig to "OFF" position.)
3) Set the POWER switch to the "VCR" position.
4) Supply the power (DC 6~7V) while holding the PLAY button depressed.
5) Check that the camera/recorder enters the play mode automatically for several seconds and then the power is turned off automatically.
6) Disconnect the ATF jig from the CN612 and remove the power supply.

CONFIRMATION
1) Supply the power (DC 6~7V) to unit.
2) Connect the ATF jig to CN612 on the main circuit board.
3) Load an alignment tape and place the instrument in the PLAY mode.
4) Connect the oscilloscope terminated with 75 ohms to video out (AV OUT).
5) Trigger the oscilloscope at SW30Hz. (Use TP1 on the ATF jig.)
6) Set the oscilloscope to the (-) slope and confirm that the trailing edge of the SW30Hz signal is 6H ± 1.5H (horizontal) line before the start of channel-1 vertical sync.
7) Set the oscilloscope to the (+) slope and confirm that the leading edge of the SW30Hz signal is 6H ± 1.5H (horizontal) line before the start of channel-2 vertical sync.

Note: The waveform of channel-1 and channel-2 video signals in the diagram may be opposite depending on the alignment tape.

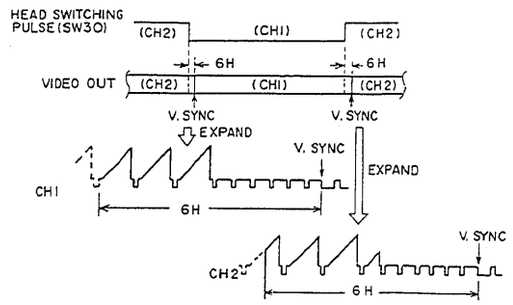


Fig. 4-102

(2) Setting the Power Shut Off Level (Figs. 4-151, 4-152)

Note: Be sure to set the power shut off level after replacing the main circuit board (EA ROM).
The power shut off level can be set automatically by performing the following steps.
Be sure to connect the camera block and EVF block when setting the power shut off level .

TEST POINTS		ADJUST POINTS	CONDITION	EQUIPMENT/JIG	SPECIFICATION
·CN612 ·PG515-1 ·PG515-2 (GND)	MAIN REG REG			·ATF Jig ·Blank Tape ·DVM ·DC Power Supply (5~7V)	

SETTING
1) Set the POWER switch to the "CAM" position.
2) Loading a blank tape and set the 8mm video camera to the RECORD mode.
3) Connect the DVM to PG515-1 on the regulator block.
(Use PG515-2 as ground.)
4) Adjust the voltage control of DC power supply so the voltage at PG515-1 is 5.6V ± 0.05V.
5) Set the 8mm video camera to the POWER SAVE mode and then disconnect the power supply.
6) Connect the ATF jig to CN612 on the main circuit board.
7) Set the POWER switch to the "VCR" position.
8) While holding the REWIND button depressed, supply the power with the voltage (PG515-1 is 5.6V ± 0.05V) set in step 4.
9) Check that the 8mm video camera enters record mode automatically for several seconds and then the power is turned off automatically.
Check that the power voltage in the record mode is 5.6V ± 0.05V.
If it is not 5.6V, set it to 5.6V and then perform adjustment from step 4 again.
10) Disconnect the ATF jig from CN612 and remove the power supply.

CONFIRMATION
1) Set the POWER switch to "CAM" position.
2) Load a blank tape and set the 8mm video camera to the RECORD mode.
3) Connect the DVM to PG515-1 on the regulator block.
(Use PG515-2 as ground.)
4) Check that the unit is shut off when the power voltage (PG515-1) is set to DC 5.6V.

3-7. LUMINANCE/CHROMA CIRCUIT

(1) AGC Adjustment (Figs. 4-103, 4-151)

PURPOSE	To set the video output level in the E-E mode.				
INCOMPLETED PHENOMENON	The picture becomes dark or whitish in the E-E mode.				
TEST POINTS	ADJUST POINTS		CONDITION	EQUIPMENT/JIG	SPECIFICATION
·VIDEO OUT (AV OUT)	·RT112 (AGC)	MAIN	·Apply a color bar signal (1Vp-p). ·STOP mode.	·Oscilloscope ·Color Bar Generator	1V ± 0.02Vp-p

1) Connect the oscilloscope terminated with 75 ohms to video out (AV OUT).
2) Trigger the oscilloscope internally.
3) Adjust RT112 for 1V ± 0.02Vp-p.

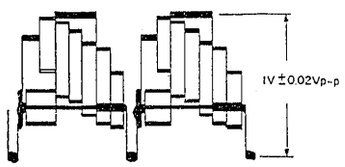


Fig. 4-103

(2) Comb Filter Adjustment (Figs. 4-104, 4-151)

PURPOSE	To set the characteristic of the comb filter.				
INCOMPLETED PHENOMENON	·Jamming occurs at the edges. ·The chroma S/N deteriorates.				
TEST POINTS	ADJUST POINTS		CONDITION	EQUIPMENT/JIG	SPECIFICATION
·TP108 ·TP113 (GND)	MAIN MAIN	·RT101 (COMB FILTER GAIN 1) ·RT102 (COMB FILTER PHASE) ·RT113 (COMB FILTER GAIN 2)	MAIN MAIN MAIN	·Apply a color bar signal (1Vp-p). ·STOP mode.	·Oscilloscope ·Color Bar Generator	Minimize the residual chroma components.

1) Connect the oscilloscope to TP108.
2) Trigger the oscilloscope at video signal.
3) Adjust RT101, RT102 and RT113 to minimize the residual chroma components.

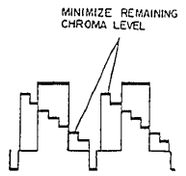


Fig. 4-104

(3) Trap Frequency Adjustment (Figs. 4-105, 4-151)

PURPOSE	To set the characteristic of the filter in the IC.				
INCOMPLETED PHENOMENON	The chroma S/N deteriorates.				
TEST POINTS	ADJUST POINTS		CONDITION	EQUIPMENT/JIG	SPECIFICATION
·TP107 ·TP109 ·TP113 (GND)	MAIN MAIN MAIN	·RT110 (IR ADJ)	MAIN	·Apply a color bar signal (1Vp-p). ·STOP mode.	·Oscilloscope ·Color Bar Generator	Minimize the residual chroma components.

1) Connect the oscilloscope to TP107.
2) Trigger the oscilloscope at video signal.
3) Connect TP109 to TP113 (GND).
4) Adjust RT110 to minimize the residual chroma components.
5) Remove the TP109 from TP113.

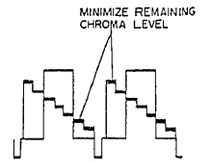


Fig. 4-105

(4) Emphassis Input Level Adjustment (Figs. 4-106, 4-151)

PURPOSE	To set the input level of the sub-emphasis circuit.				
INCOMPLETED PHENOMENON	Undershoots or overshoots occur in the picture.				
TEST POINTS	ADJUST POINTS		CONDITION	EQUIPMENT/JIG	SPECIFICATION
·TP116 ·TP113 (GND)	MAIN MAIN	·RT105 (EMPH. INPUT LEVEL)	MAIN	·Apply a color bar signal (1Vp-p). ·STOP mode.	·Oscilloscope ·Color Bar Generator	0.45V ± 0.01Vp-p

1) Connect the oscilloscope to TP116.
2) Trigger the oscilloscope at video signal.
3) Adjust RT105 for 0.45V ± 0.01Vp-p.

Fig. 4-106

(5) Carrier Frequency Adjustment (Figs. 4-107, 4-151)

PURPOSE		To set the modulation frequency at the sync tip of the FM modulator to the specified value.				
INCOMPLETED PHENOMENON		Black and white are inverted in the picture.				
TEST POINTS		*ADJUST POINTS*		*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
·TP106 ·TP113 (GND)	MAIN MAIN	·RT104 (Fo ADJ)	MAIN	·Apply a white (100%) signal. ·STOP mode.	·Oscilloscope ·Color Bar Generator	238nS ± 3nS

1) Connect the oscilloscope to TP106.
2) Trigger the oscilloscope internally.
3) Adjust RT104 so the period of the widest pulse is 238nS ± 3nS.

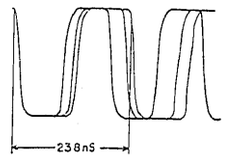


Fig. 4-107

(6) Deviation Adjustment (Figs. 4-108, 4-151)

PURPOSE		To set the modulation frequency at the white peak of the FM modulator to the specified value.				
INCOMPLETED PHENOMENON		The picture becomes dark or whitish during recording and playback.				
TEST POINTS		*ADJUST POINTS*		*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
·TP106 ·TP113 (GND)	MAIN MAIN	·RT103 (DEV. Fo ADJ)	MAIN	·Apply a white (100%) signal. ·STOP mode.	·Oscilloscope ·Color Bar Generator	185nS ± 2nS

1) Connect the oscilloscope to TP106.
2) Trigger the oscilloscope internally.
3) Adjust RT103 so the period of the narrowest pulse is 185nS ± 2nS.

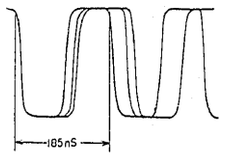


Fig. 4-108

(7) Playback Luminance Signal Level Adjustment (Figs. 4-109, 4-110, 4-151)

PURPOSE		To set the luminance playback level to the specified value.				
INCOMPLETED PHENOMENON		The picture becomes dark or whitish during playback.				
TEST POINTS		*ADJUST POINTS*		*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
·TP114 ·TP113 (GND) ·VIDEO OUT (AV OUT)	MAIN MAIN	·RT109 (PB LUMA LEVEL 1) ·RT106 (PB LUMA LEVEL 2)	MAIN MAIN	·Playback the alignment tape	·Oscilloscope ·Alignment Tape	·0.5V ± 0.01Vp-p ·1V ± 0.02Vp-p

1) Connect the oscilloscope to TP114.
2) Trigger the oscilloscope at video signal.
3) Adjust RT109 so that the waveform of TP114 is 0.5V ± 0.01Vp-p. (Fig. 4-109)
4) Connect the oscilloscope terminated with 75 ohms to video out (AV OUT).
5) Trigger the oscilloscope internally.
6) Adjust RT106 so that the waveform of video out is 1V ± 0.02Vp-p. (Fig. 4-110)

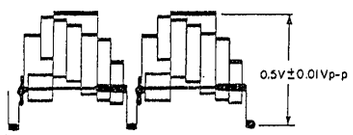


Fig. 4-109

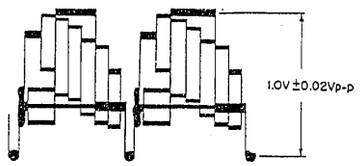


Fig. 4-110

(8) Record Luminance Signal Level Adjustment (Figs. 4-111, 4-151)

PURPOSE		To set the luminance recording level to the specified value.				
INCOMPLETED PHENOMENON		·The luminance S/N deteriorates. ·Oblique beats occur in the picture. ·Black and white are inverted in the picture.				
TEST POINTS		*ADJUST POINTS*		*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
·TP105 ·TP113 (GND)	MAIN MAIN	·RT114 (REC LUMA LEVEL)	MAIN	·Apply a color bar signal (1Vp-p). ·STOP mode.	·Oscilloscope ·Color Bar Generator	410mV ± 10mVp-p

1) Connect the oscilloscope to TP105.
2) Trigger the oscilloscope at video signal.
3) Adjust RT114 so that the record luminance level is 410mV ± 10mVp-p.

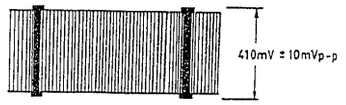


Fig. 4-111

(9) Record Chroma Signal Level Adjustment (Figs. 4-112, 4-151)

PURPOSE		To set the chroma recording level to the specified value.				
INCOMPLETED PHENOMENON		·The chroma S/N deteriorates. ·Oblique beats occur in the picture.				
TEST POINTS		*ADJUST POINTS*		*CONDITION*	*EQUIPMENT/JIG*	*SPECIFICATION*
·TP112 ·TP113 (GND)	MAIN MAIN	·RT115 (REC CHROMA LEVEL)	MAIN	·Apply a color bar signal (1Vp-p). ·STOP mode.	·Oscilloscope ·Color Bar Generator	240mV ± 5mVp-p

1) Connect the oscilloscope to TP112.
2) Trigger the oscilloscope at video signal.
3) Adjust RT115 so that the burst level on the record chroma level is 240mV ± 5mVp-p.

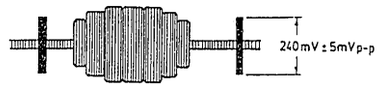
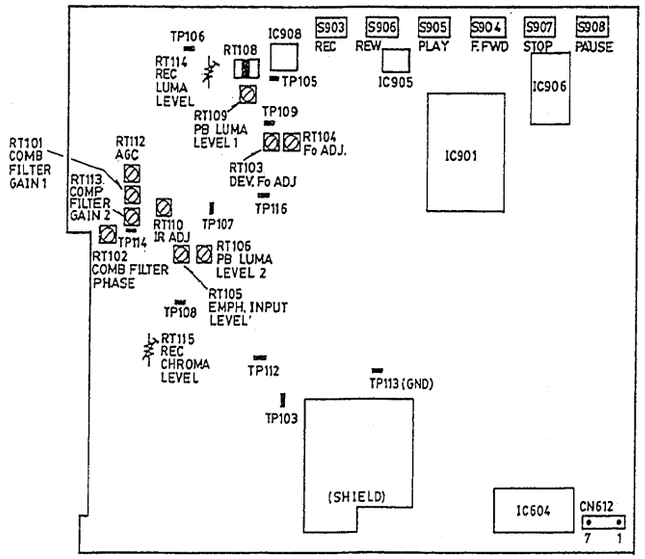


Fig. 4-112

3-8. ADJUSTMENT COMPONENTS LOCATIONS



CN612

TEST TERMINAL	
1	5V
2	TRACKING
3	SW30Hz
4	GND
5	FM OUT
6	TEST
7	REMOTE

Fig. 4-151 Main (MAIN) Circuit Board (Side-A)

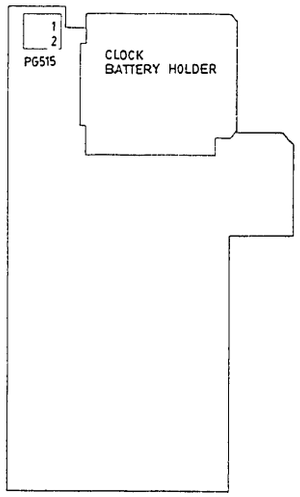


Fig. 4-152 Regulator (REG) Block (Component Side)

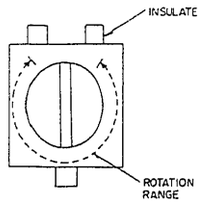


Fig. 4-153

Note: Electrical adjustments of the VCR block cannot be done in the state that the unit is shipped from the factory. Unsolder the laser trimming resistors on the circuit board and solder the specified semi-variable resistors. (See the table below.)

ADJUST POINT	SEMI-VARIABLE RESISTOR (Ω)	C.B.A	NAME OF ADJUSTMENT
RT101	50 k	MAIN	COMB FILTER GAIN 1
RT102	500	MAIN	COMB FILTER PHASE
RT103	5 k	MAIN	DEV. Fo ADJ
RT104	10 k	MAIN	Fo ADJ
RT109	500	MAIN	PB LUMA LEVEL 1
RT110	20 k	MAIN	IR ADJ
RT112	50 k	MAIN	AGC
RT113	50 k	MAIN	COMB FILTER GAIN 2
RT106	2 k	MAIN	PB LUMA LEVEL 2
RT105	2 k	MAIN	EMPH. INPUT LEVEL

Note: Insulate the terminals shown in Fig. 4-153 when soldering. Adjust the semi-variable resistors within the range shown in Fig. 4-153.

CHAPTER 5 SCHEMATIC DIAGRAM AND CIRCUIT BOARD DIAGRAMS

WHEN USING THIS SERVICE REFERENCE MATERIAL

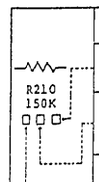
1. Markings in Schematic and Circuit Board Diagrams

(1) Parts with marks "■" attached to circuit numbers in the schematic and circuit board diagrams are discrete components.
(2) Parts with marks (2) in the circuit board diagrams are leadless jumpers.

2. How to Read Abbreviations

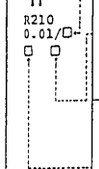
Values, dielectric resistances (power capacitances), tolerances, grades of resistors (excluding variable resistors, etc.) and capacitors are indicated in the schematic diagrams using abbreviations. Collate these abbreviations and the following tables for reading abbreviations to replace parts correctly.

2-1. Resistors



Value		No indication ..... ohm K ..... kohm
Tolerance		No indication ..... ±5% K ..... ±10% M ..... ±20%
Power capacitance		No indication ..... 1/8W (All capacitances other than 1/8W are indicated in schematic diagrams with W omitted)
Type		No indication .. Carbon film fixed RC ..... Carbon solid RW ..... Power-type wire-wound solid RS ..... Metal oxide film solid RN ..... Metal film solid
Example		
R210 150K		150 kohm, carbon solid
RC.1/2.K		1/2W, ±10%

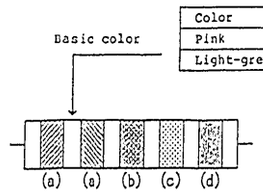
2-2. Capacitors



Value		No indication ..... μF P ..... PF
Dielectric resistance		No indication ..... 50WV (All resistances other than 50WV and those of electrolytic capacitors are indicated with WV omitted.)
Tolerances		No indication ..... ±10% J ..... ±5% M ..... ±20% C ..... ±0.25PF Z ..... +80%/-20% (No indication with electrolytic capacitors (excluding tantalum and high stability electrolytic capacitors)
Type		No indication .. Ceramic, general electrolytic (see circuit symbol to distinct from ceramic) MYL ..... Mylar (Polyester film) STY ..... Styrol TA ..... Tantalum KU ..... High stability electrolytic MP ..... Metalized paper
Example		
C210 0.01/25		Mylar, 0.01μF, 25WV
MYL.J		±5%

3. How to Read Capacitance of Resistance-Type Capacitors and Coils

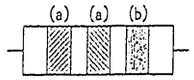
3-1 Capacitors



Color	Related voltage
Pink	25V
Light-green	50V

Color	Capacitance (a)	Multiplier (b)	Tolerance (c)	Characteristics (d)
Black	0	10^0	±20%	For temperature compensation
Brown	1	10^1		
Red	2	10^2		
Orange	3	10^3		
Yellow	4	10^4		
Green	5	10^5		
Blue	6	10^6		
Purple	7			
Gray	8		±30%	High permittivity type
White	9			For temperature compensation
Gold			±5%	
Silver			±10%	

3-2 Coils



4. Cautions on Use of MOS ICs

(1) MOS ICs are inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during storage. Avoid removing ICs from this foam, placing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
(2) High voltages may be applied during soldering caused by leakages from the soldering iron, so be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
(3) The human body and clothes made of synthetic fibres or nylon gloves may be charged with several thousands volts of static electricity because of friction, so workers should be grounded.
(4) Be sure to ground measuring instruments such as oscilloscopes, VTVMs, etc. used for repairs.

5. Measure the voltages at each section with the negative side of power supply as a reference.

The voltages in the camera section are measured with the VTR in the record mode, and those in the VTR section are measured in the record and playback modes.

* Voltages in ( ) are in the record mode.
* One voltage value is common for recording and playback.

LEADLESS COMPONENT IDENTIFICATION

1. Leadless Transistors

The leadless transistor number is indicated by a code on its surface, using one letter, one letter and one numeral, two letters, two letters and one numeral, two numerals, two numerals and one letter, or three letters.

Letter	Transistor Number	Letter	Transistor Number
A	2SB709	H	2SA1036K
A(R)	2SB1218R(AR)	I	2SB792
A(S)	2SB766S(AS)	J	2SC2735
A(J)	2SB1000J(AJ)	K	2SA1036
B	2SC1621	K(P)	2SC2413P(KP)
B(J)	2SB1001J(BJ)	L	2SC2462
B(R)	2SC4081R(BR)	M	2SA1052
B(R)	2SC2412AR(BR)	N	2SC1653
B(S)	2SC2412KS(BS)	N(E)	2SD1306E(NE)
C	2SA1122	P	2SD814
C(L)	2SD999L(CL)	P(E)	2SA1171E(PE)
C(R)	2SB710R(CR)	Q	2SC2620
C(R)	2SC4097R(CR)	Q(O)	2SC2714O(QO)
C(R)	2SC2411R(CR)	R	2SC2618
C(Q)	2SC2411KQ(CQ)	S	2SA1121
D	2SC2463	S(Q)	2SC3082KQ(SQ)
D(L)	2SB798L(DL)	U	2SC2404
E	2SA1022	W	2SD602
F	2SC2619	Y	2SD601
F(S)	2SA1037KS(FS)	Y(R)	2SD1819R(YR)
F(R)	2SA1576R(FR)	Z	2SD874
AA(S)	2SD1757KS(AAS)	DB(R)	2SD1766R(DBR)
BC(R)	2SB1188R(BCR)	IR(D)	2SA1484D(IRD)
BF(R)	2SB1308R(BFR)		
1D(T)	2SD1328T(1DT)	1C(R)	2SB902R(1CR)
B(3)	2SC1621(3)(B3)	L(6)	MMBC1623(6)(L6)
C(7)	2SA811(7)(C7)	L(6)	2SC1623(6)(L6)
L(7)	2SC2812(7)(L7)	F(2)	2SC1009(2)(F2)
M(6)	2SA812(6)(M6)	M(6)	2SA1179(6)(M6)
N(4)	2SC1653(4)(N4)		
D(16)	2SC1622A(16)(D16)	R(25)	2SC3356(25)(R25)
R(35)	2SC3583(35)(R35)	R(45)	2SC3585(45)(R45)
Y(25)	NTM3906(25)(Y25)		
1(D)	2SC3127D(1D)		
S1	FMS1	S2	FMS2
T1	IMT1	W1	FMW1
W2	FMW2	W3	FMW3
X1	IMX1	Y1	FMY1
Y3	FMY3	Z1	IMZ1
Z2	IMZ2		
4R	XN1C301	5H	XN4501
5K	XN4401		
Digital Transistor			
04	DTC114TK	06	DTC144TK
13	DTA143EK	15	DTA124K
15(s)	DTA124EU	16	DTA144EK
16(s)	DTA144EU	23	DTC143EK
24	DTC114EK	24(s)	DTC114EU
25	DTC124K	25(s)	DTC124EU
26	DTC144K	26(s)	DTC144EU
33	DTA143XK	43	DTC143XK
52	DTA123YK	64	DTC114YK
6B	UN5112	8B	UN5212
F52	DTB123	G21	DTD113ZK
H03	DTC343TK	H27	DTC363EK
R31	FP1L2Q		
A1	FMA1	A2	FMA2
B2	IMB2	C2	FMC2
D2	IMD2	G1	FMG1
G2	FMG2	G5	FMG5
H2	IMH2		

Letter	Transistor Number	Letter	Transistor Number
FET			
G	2SK302	J	2SK208
K	2SK160	W	2SK322
X	2SK157	X(4)	2SK94(4)(X4)
X(17)	2SK425(17)(X17)		
Y	2SK197	Z	2SK217
XA	2SK980		
3	2SK620	3(O)	2SK621(O)(30)
1M	2SA1052	1F	2SK321
1K	2SK316	2B	2SK374

* "(s)" in the above table shows a component with smaller size.
* Codes on the digital transistors show only the transistor numbers.

(1) Identification for two letters.
Use this code and the following chart for component identification.

Example:

Code	Number
CD	2SA1122D
LD	2SC2462D

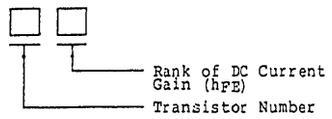


Fig.5-1 Leadless Transistor Code

(2) Identification for two types of one letter and one numeral.
Use this code and the following chart for component identification.

Letter	Transistor Number
L	2SC1623

Example:

Code	Number
L5	2SC1623(5)
L6	2SC1623(6)

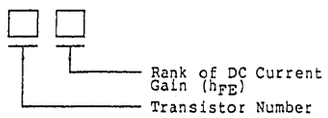
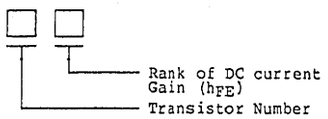


Fig.5-2 Leadless Transistor Code

Example:

Code	Number
1D	2SC3127D



Note: Codes S1, S2, T1, W1, W2, W3, X1, Y1, Y3, Z1 and Z2 show only the transistor numbers.

Fig.5-3 Leadless Transistor Code

(3) Identification for one numeral and two letters.
Use this code and the following chart for component identification.

Example:

Code	Number
1FQ	2SK321Q

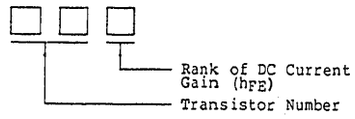


Fig.5-4 Leadless Transistor Code

(4) Identification for one letter and two numerals.
Use this coce and the following chart for component identification.

Example:

Code	Number
R25	25C3356

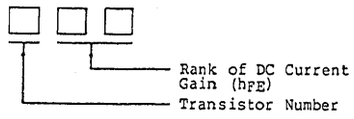


Fig. 5-5 Leadless Transistor Code

(5) Identification for two letters and one numeral.
Use this code and the following chart for component identification.

Example:

Code	Number
DV5	2SD596

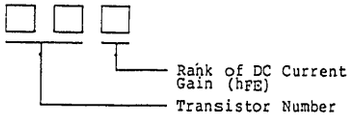


Fig. 5-6 Leadless Transistor Code

(6) Identification for three letters.
Use this code and the following chart for component identification.

Example:

Code	Number
AAS	2SD1757KS

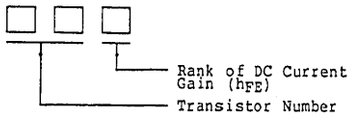


Fig. 5-7 Leadless Transistor Code

2. Leadless Diodes

Leadless diode numbers are indicated by a code on the surface, using one letter and one numeral, two letters, two letters and one numeral, two numerals, two numerals and one letter, or three numerals.
Use this code and the following chart for component identification.

Code	Diode Number	Code	Diode Number
BE	1SV172		
MC	MA153	MC(s)	MA143
MH	MA151K	MH(s)	MA141K
MN	MA151WA	MN(s)	MA141WA
MO	MA152WA		
MT	MA151WK	MT(s)	MA141WK
MU	MA152WK		
M1D	MA160	M1P	MA714
M2A	MA122	S1A	1SR143
N	DAN202K	Z	DA106K
A3	1S2835	A5	1S2837
C1	HSM88S	C2	HSM276S
1A	MA110		
3.0L	MA3030L	4.3L	MA3043L
4.7M	MA3047M	5.1M	MA3051M
5.1L	MA3051L	5.6M	MA3056M
6.2L	MA3062L	6.8M	MA3068
6.8M	MA3068M	7.5H	MA3075H
7.5L	MA3075L	8.2M	MA3082M
9.1M	MA3091	9.1M	MA3091M
10L	MA3100L	56M	MA3056M
75L	MA3075L	82M	MA3082M
91M	MA3091M		
20	HZM6-B	27	RD2.7M-B
30	RD3.0M-B	51	RD5.1M-B2
56	RD5.6M-B	91	RD9.1M-B
102	RD10M-B2	122	RD12M-B2
163	RD16M-B3	182	RD18M-B2
271	RD2.7M-B	272	RD2.7M-B2
301	RD3.0M-B	362	RD3.6M-B2
391	RD3.9M-B1	512	RD5.1M-B2
561	RD5.6M-B	621	RD6.2M-B1
681	RD6.8M-B	683	RD6.8M-B3
911	RD9.1M-B		

* "(s)" in the above table shows a component with smaller size.

3. Leadless Resistors

The resistor value is indicated on the surface of the component, using a three-digit numbers, or one letter and one numeral.

(1) Identification for three digit numbers.
Read this code following the same procedure as when reading the color code on discrete resistors.

Example:

Code	Value
330	33×10^0 = 33 ohms
561	56×10^1 = 560 ohms
123	12×10^3 = 12K ohms
1R2	1 + 0.2 = 1.2 ohms (R: Decimal point)

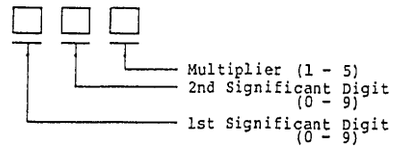


Fig. 5-8 Leadless Resistor Code

(2) Identification for one letter and one numeral.
Use this code and the following chart for component identification.

Letter	Value	Letter	Value	Letter	Value
A	1	J	2.2	S	4.7
C	1.2	L	2.7	U	5.6
E	1.5	N	3.3	W	6.8
G	1.8	Q	3.9	Y	8.2

Example:

Code	Value
A1	1×10^1 = 10 ohms
G2	1.8×10^2 = 180 ohms
L3	2.7×10^3 = 2700 ohms
S4	4.7×10^4 = 47K ohms
W5	6.8×10^5 = 680K ohms

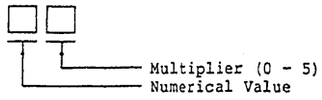
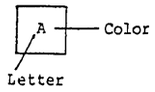


Fig. 5-9 Leadless Resistor Code

4. Leadless Capacitors
   The capacitance value is indicated on the surface of the component, using body color and one letter, or one letter and one numeral.

(1) Identification for body color and one letter.

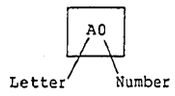


Body Color	Letter	Value	Body Color	Letter	Value
Red	A	1(PF)	Blue	A	100(PF)
	C	2		C	120
	E	3		E	150
	G	4		G	180
	J	5		J	220
	L	6		L	270
	N	7		N	330
	Q	8		Q	390
	S	9		S	470
				U	560
Black	A	10(PF)		W	680
	C	12		Y	820
	E	15			
	G	18	White	A	0.001(μF)
	J	22		E	0.0015
	L	27		J	0.0022
	N	33		L	0.0027
	Q	39		N	0.0033
	S	47		S	0.0047
	U	56		W	0.0068
	W	68			
	Y	82	Green	A	0.01(μF)
				E	0.015
				J	0.022
				N	0.033
				S	0.047
				U	0.056
				W	0.068
				Y	0.082
			Yellow	A	0.1(μF)

Example:

Color	Code	Value
Red	A	1PF
Black	A	10PF

(2) Identification for one letter and one numeral.

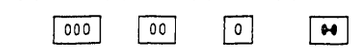


Letter /Number	Value	Letter /Number	Value
A0	1(PF)	A2	100(PF)
H0	2	C2	120
M0	3	E2	150
d0	4	G2	180
f0	5	J2	220
m0	6	L2	270
n0	7	N2	330
t0	8	Q2	390
y0	9	S2	470
		U2	560
A1	10(PF)	W2	680
C1	12	Y2	820
E1	15		
G1	18	A3	0.001(μF)
J1	22	B3	0.0015
L1	27	J3	0.0022
N1	33	N3	0.0033
Q1	39	S3	0.0047
S1	47	W3	0.0068
U1	56		
W1	68	A4	0.01(μF)
Y1	82	E4	0.015
		J4	0.022
		N4	0.033
		S4	0.047
		U4	0.056
		W4	0.068
		A5	0.1

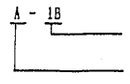
Example:

Letter /Number	Value
A0	1PF
A1	10PF

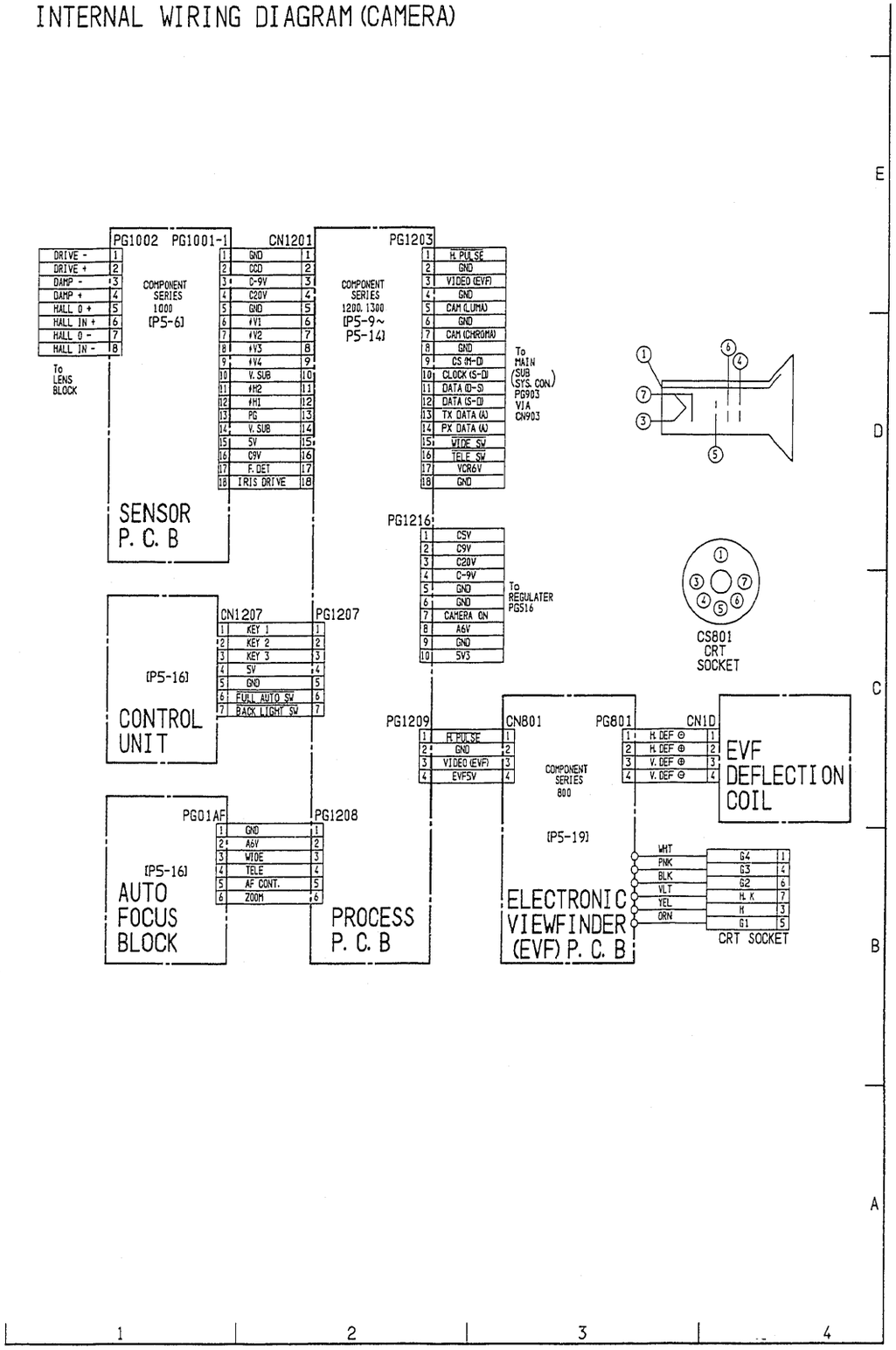
5. Leadless Jumper
   The leadless jumper is indicated as shown below.



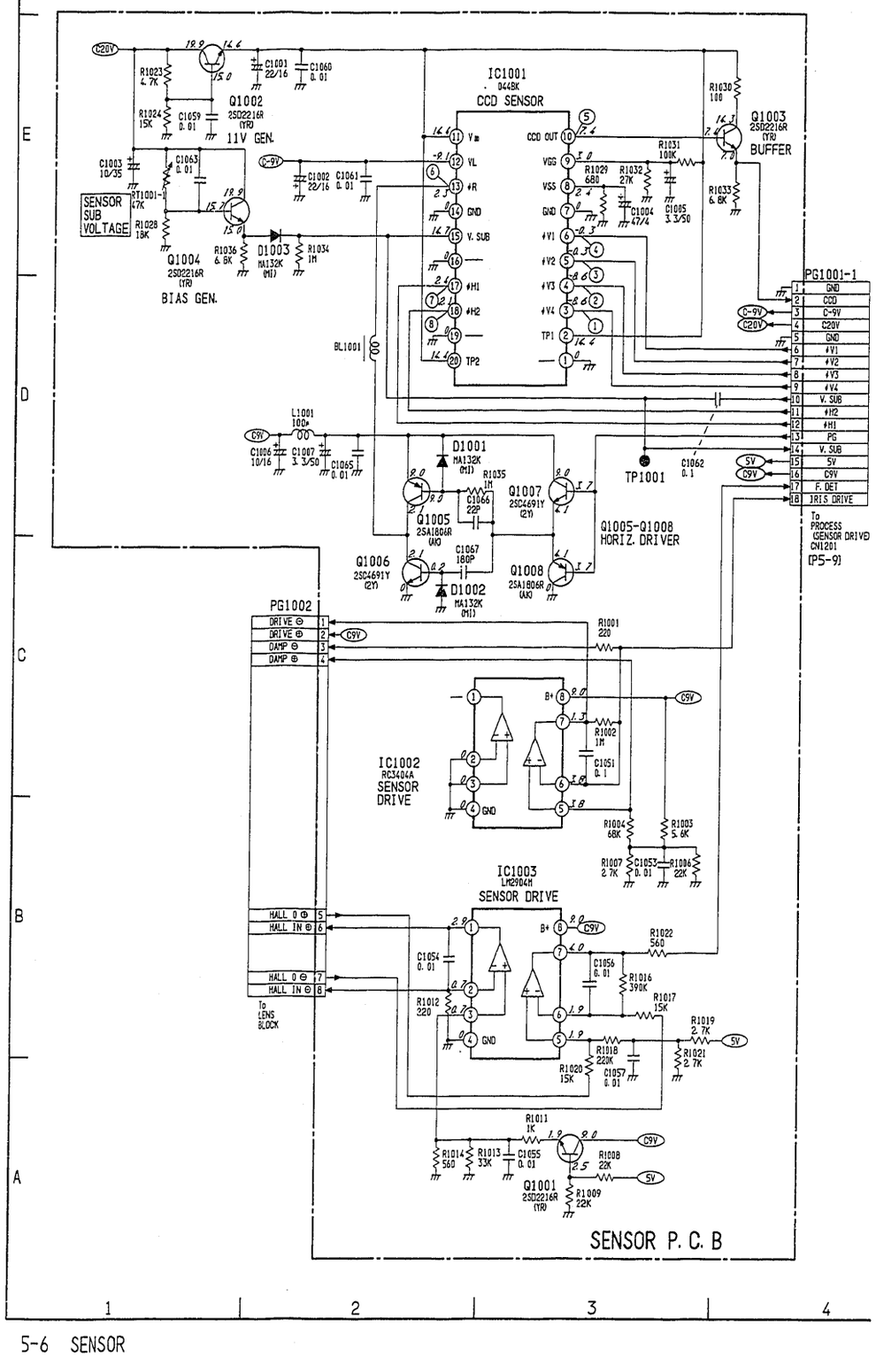
6. How to Read the Address of Leadless Components.
   Address of leadless components



INTERNAL WIRING DIAGRAM (CAMERA)

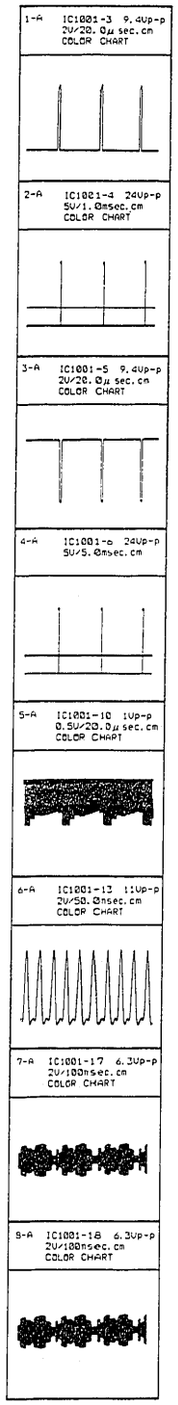


SENSOR SCHEMATIC DIAGRAM

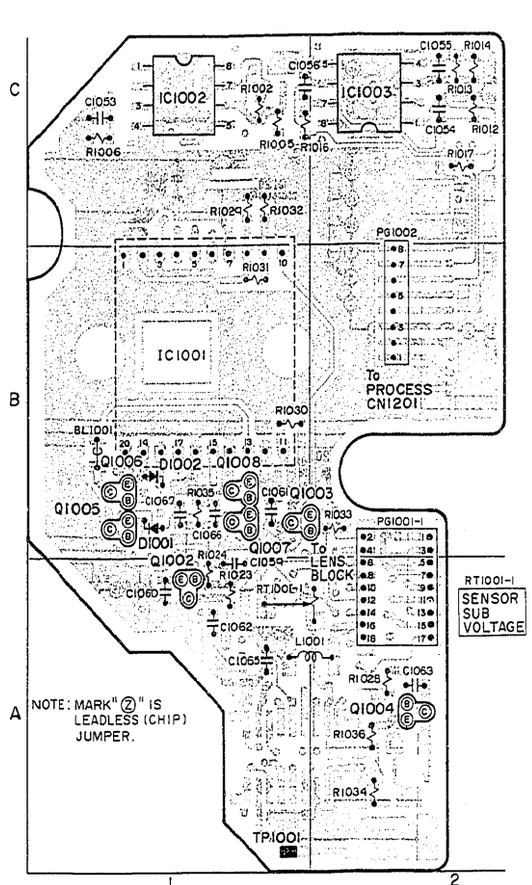


5-6 SENSOR

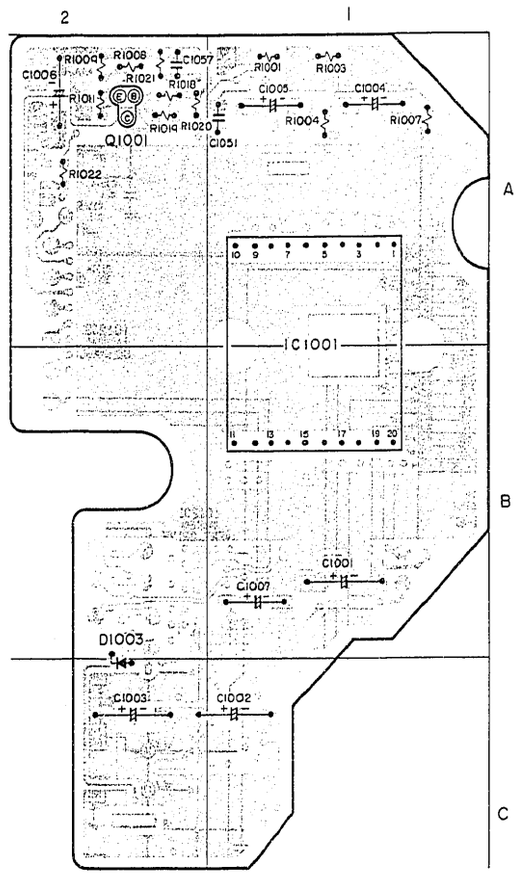
SENSOR WAVEFORMS



SENSOR CIRCUIT BOARD DIAGRAM

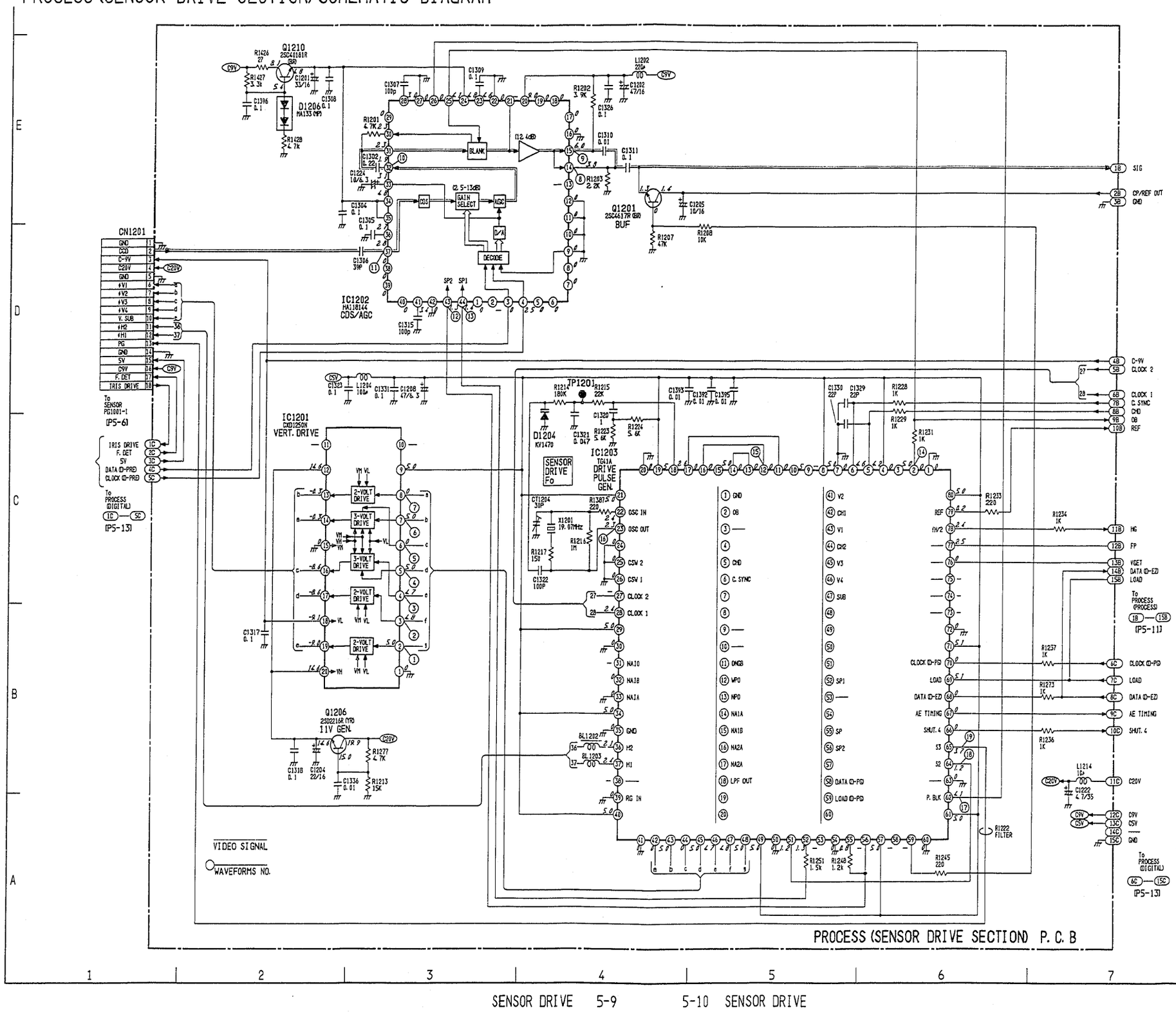


SENSOR P.C.B
－SIDE A－

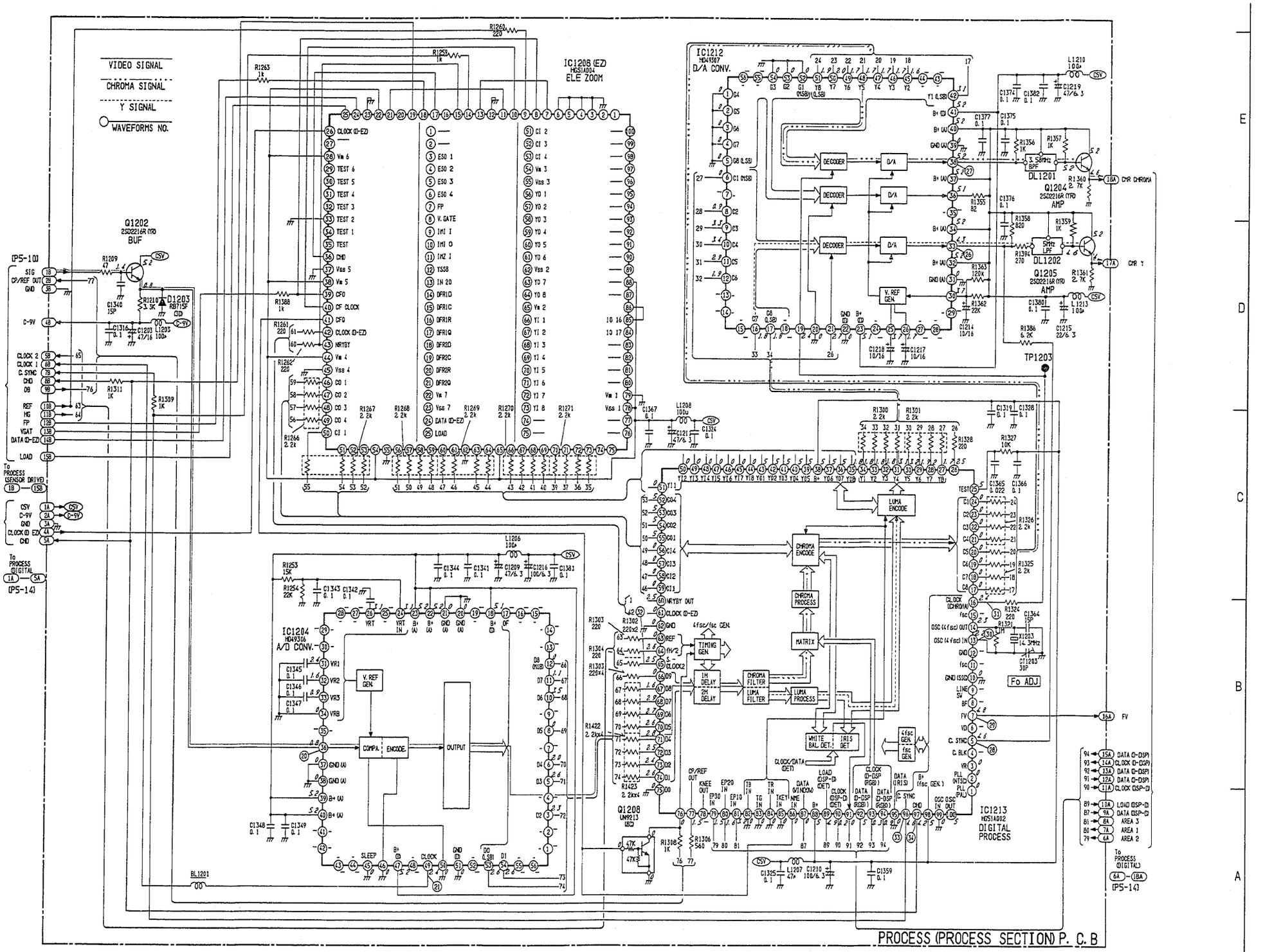


SENSOR P.C.B
－SIDE B－

PROCESS (SENSOR DRIVE SECTION) SCHEMATIC DIAGRAM

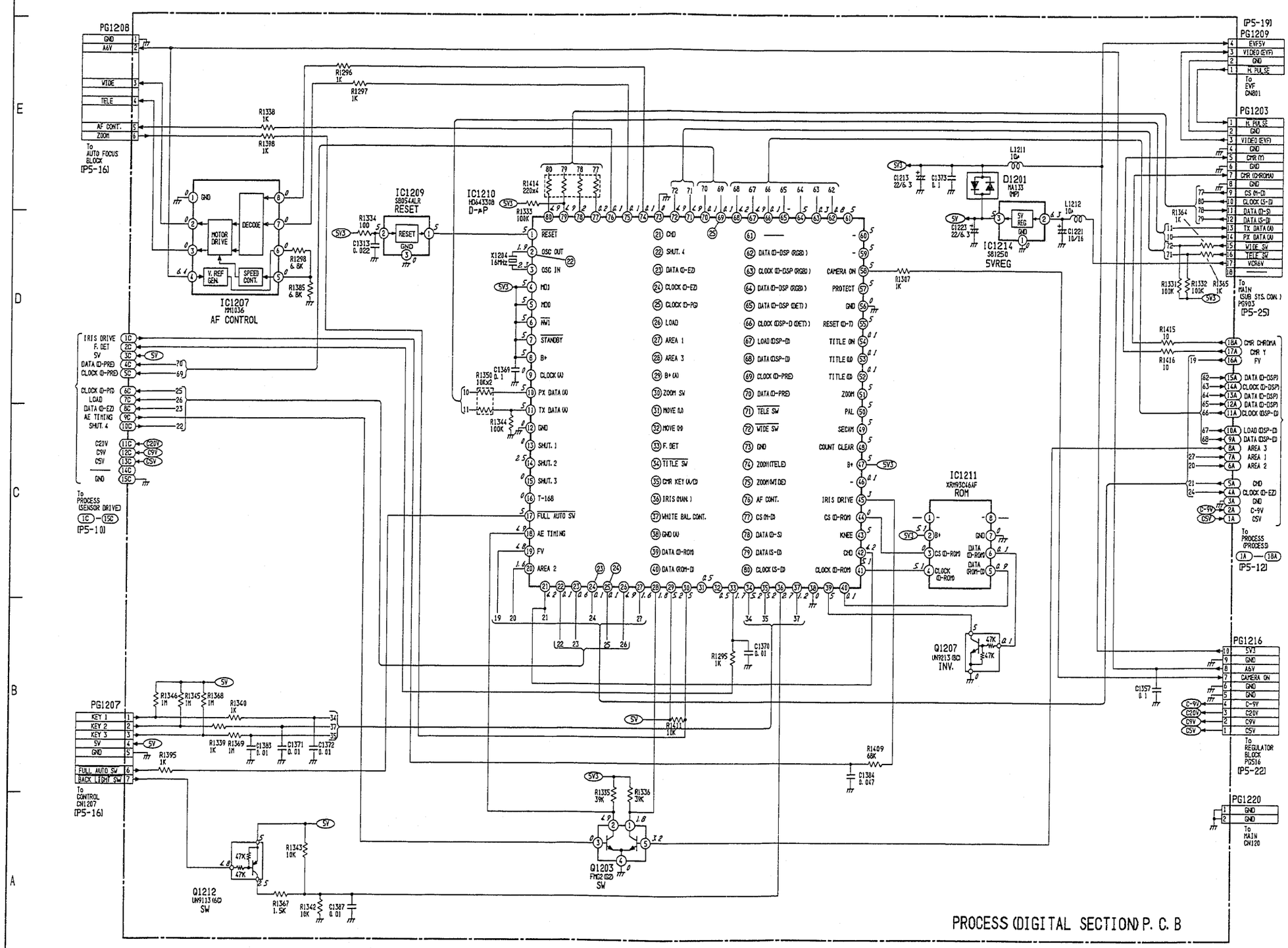


PROCESS (PROCESS SECTION) SCHEMATIC DIAGRAM

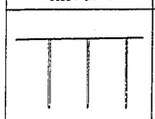
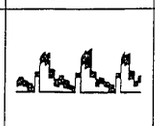
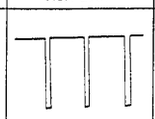
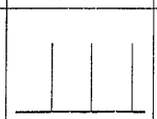
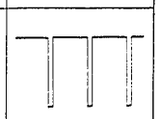
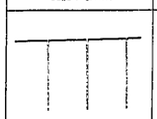
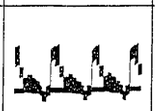
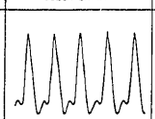
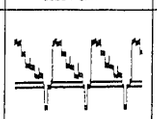
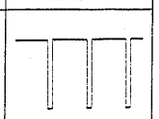
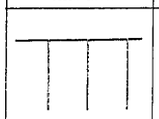
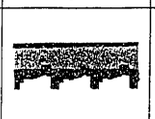
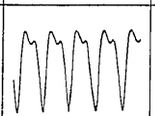
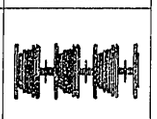
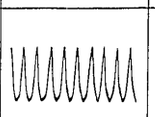
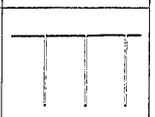
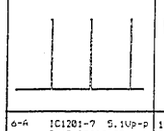
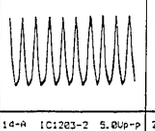
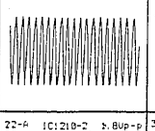
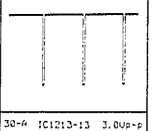
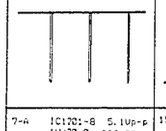
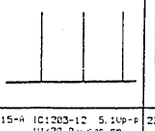
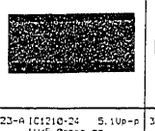
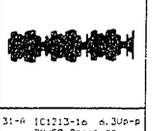
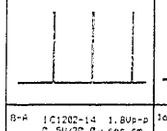
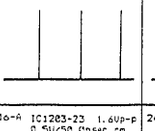
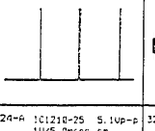
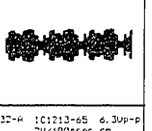
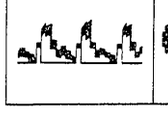
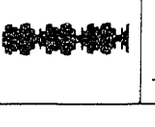
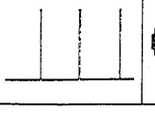
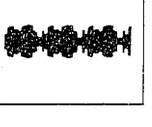


PROCESS 5-11 5-12 PROCESS

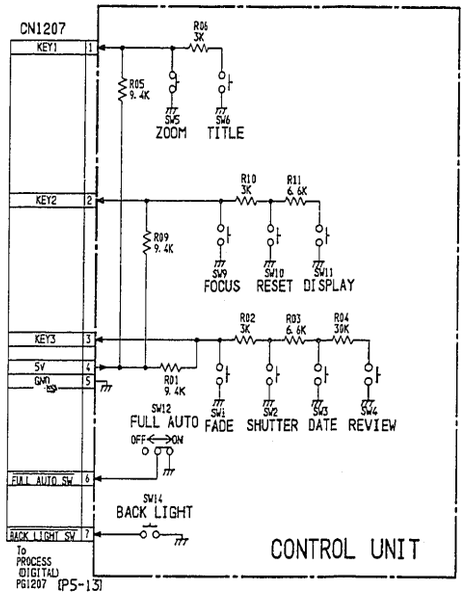
PROCESS (DIGITAL SECTION) SCHEMATIC DIAGRAM



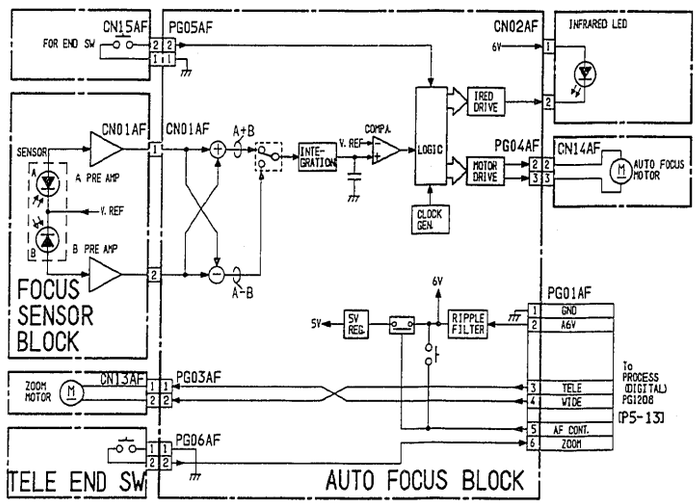
PROCESS WAVEFORMS

1-A IC1201-2 5.0Vp-p 1V/5.0msec.cm COLOR CHART	9-A IC1202-15 1.8Vp-p 0.5V/20.0μsec.cm COLOR CHART	17-A IC1203-62 5.1Vp-p 1V/20.0μsec.cm COLOR CHART	25-A IC1210-69 5.1Vp-p 1V/5.0msec.cm COLOR CHART	33-A IC1213-96 5.0Vp-p 1V/20.0μsec.cm COLOR CHART
				
2-A IC1201-3 5.1Vp-p 1V/20.0μsec.cm COLOR CHART	10-A IC1202-32 580mVp-p 0.2V/20.0μsec.cm COLOR CHART	18-A IC1203-64 5.7Vp-p 1V/50.0msec.cm COLOR CHART	26-A IC1212-33 1.4Vp-p 0.5V/20.0μsec.cm COLOR CHART	34-A IC1213-97 5.0Vp-p 1V/20.0μsec.cm COLOR CHART
				
3-A IC1201-4 5.1Vp-p 1V/20.0μsec.cm COLOR CHART	11-A IC1202-37 900mVp-p 0.2V/20.0μsec.cm COLOR CHART	19-A IC1203-65 5.7Vp-p 1V/50.0msec.cm COLOR CHART	27-A IC1212-38 1.0Vp-p 0.2V/20.0μsec.cm COLOR CHART	
				
4-A IC1201-5 5.1Vp-p 2V/5.0msec.cm COLOR CHART	12-A IC1202-43 2.4Vp-p 0.5V/100nsec.cm COLOR CHART	20-A IC1204-36 1.9Vp-p 0.5V/20.0μsec.cm COLOR CHART	28-A IC1213-5 5.0Vp-p 1V/20.0μsec.cm COLOR CHART	
				
5-A IC1201-6 5.1Vp-p 1V/20.0μsec.cm COLOR CHART	13-A IC1202-44 2.9Vp-p 0.5V/100nsec.cm COLOR CHART	21-A IC1204-49 7.2Vp-p 2V/100nsec.cm COLOR CHART	29-A IC1213-7 5.0Vp-p 1V/5.0msec.cm COLOR CHART	
				
6-A IC1201-7 5.1Vp-p 2V/5.0msec.cm COLOR CHART	14-A IC1202-2 5.0Vp-p 1V/20.0μsec.cm COLOR CHART	22-A IC1210-2 5.8Vp-p 0.5V/20.0μsec.cm COLOR CHART	30-A IC1213-13 3.0Vp-p 1V/50.0msec.cm COLOR CHART	
				
7-A IC1201-8 5.1Vp-p 1V/20.0μsec.cm COLOR CHART	15-A IC1203-12 5.1Vp-p 1V/20.0μsec.cm COLOR CHART	23-A IC1210-24 5.1Vp-p 1V/5.0msec.cm COLOR CHART	31-A IC1213-16 6.3Vp-p 2V/50.0msec.cm COLOR CHART	
				
8-A IC1202-14 1.8Vp-p 0.5V/20.0μsec.cm COLOR CHART	16-A IC1203-23 1.6Vp-p 0.5V/50.0msec.cm COLOR CHART	24-A IC1210-25 5.1Vp-p 1V/5.0msec.cm COLOR CHART	32-A IC1213-65 6.3Vp-p 2V/100nsec.cm COLOR CHART	
				

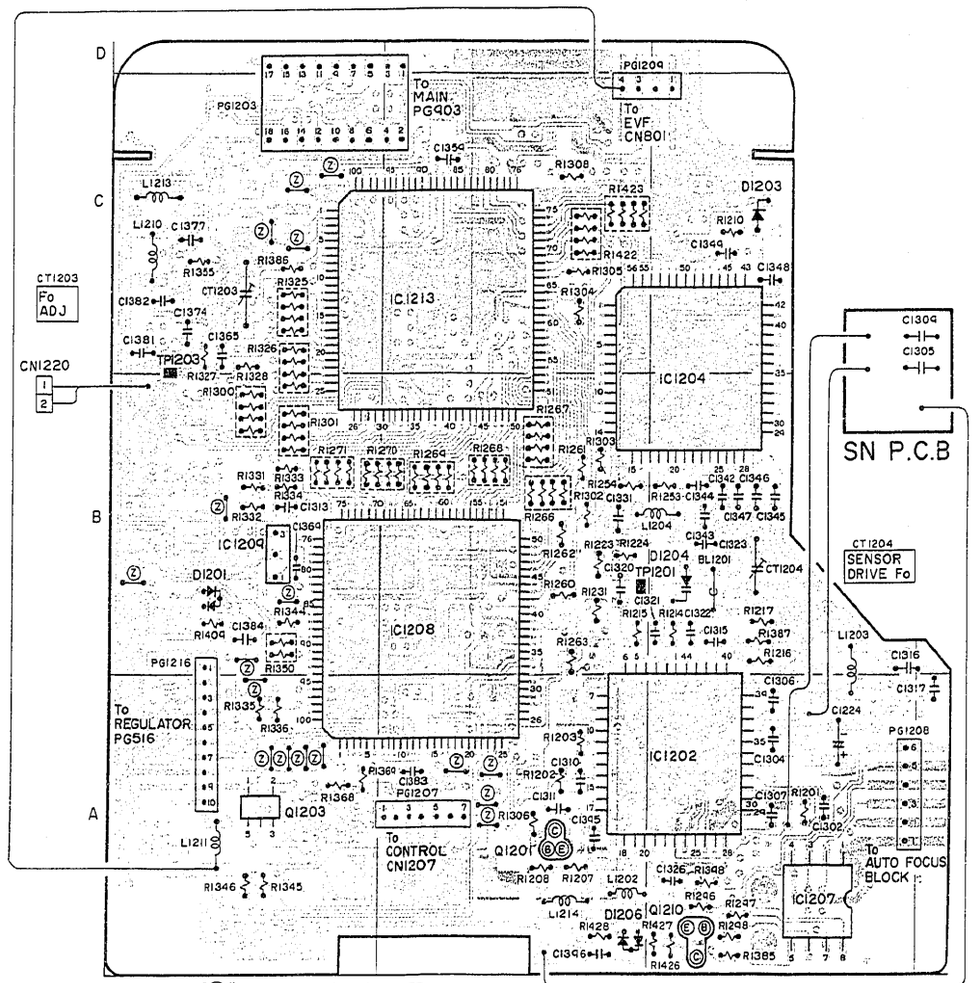
CONTROL SCHEMATIC DIAGRAM



AUTO FOCUS BLOCK DIAGRAM

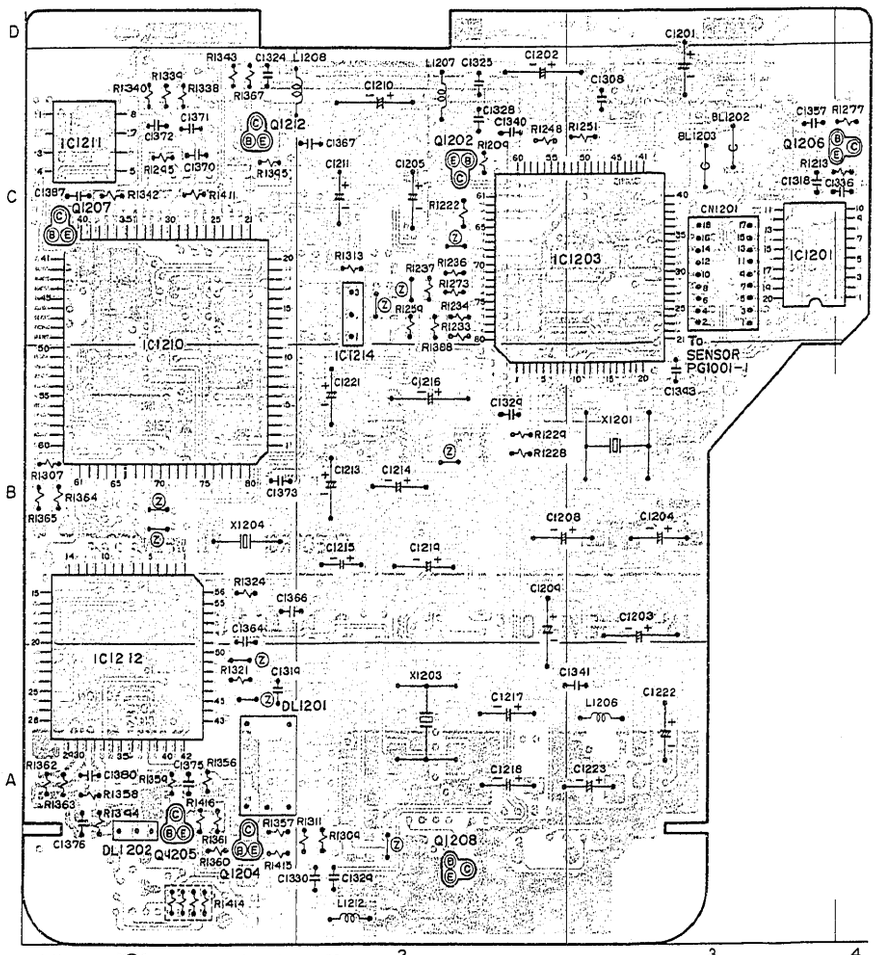


PROCESS CIRCUIT BOARD DIAGRAM



NOTE : MARK "Ⓩ" IS LEADLESS(CHIP) JUMPER.

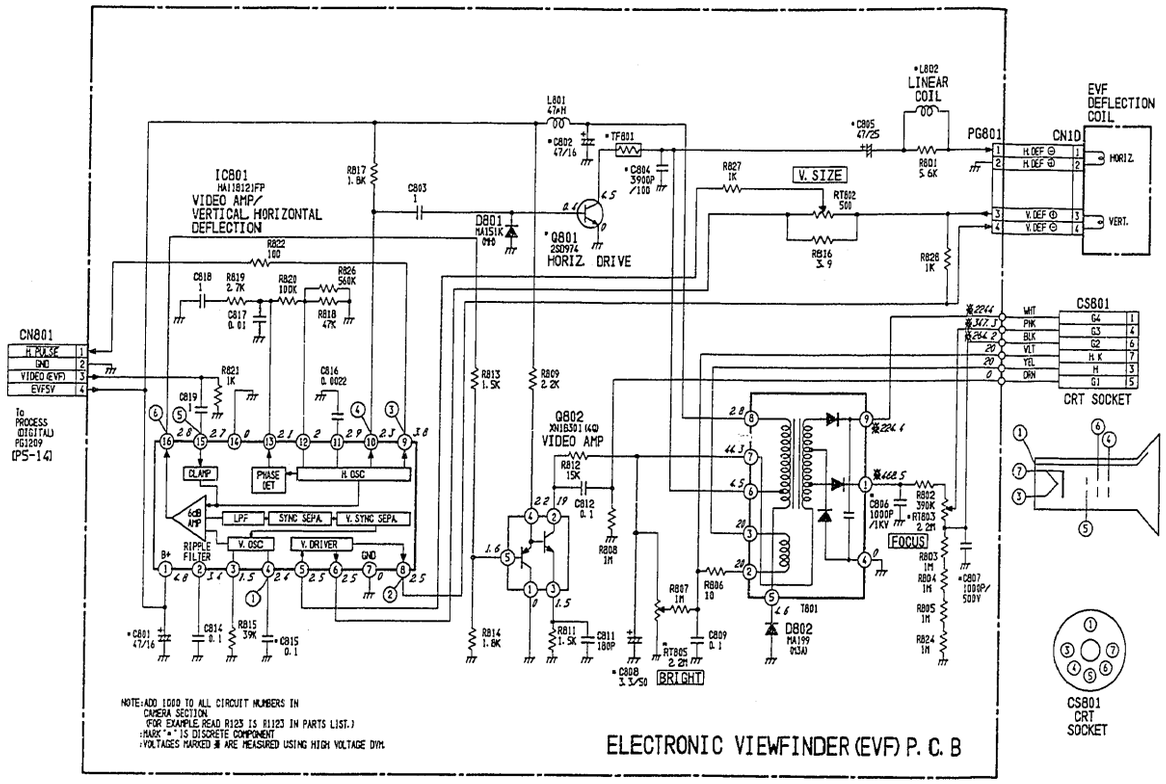
PROCESS P.C.B
-SIDE A-



NOTE : MARK "Ⓩ" IS LEADLESS(CHIP) JUMPER.

PROCESS P.C.B
-SIDE B-

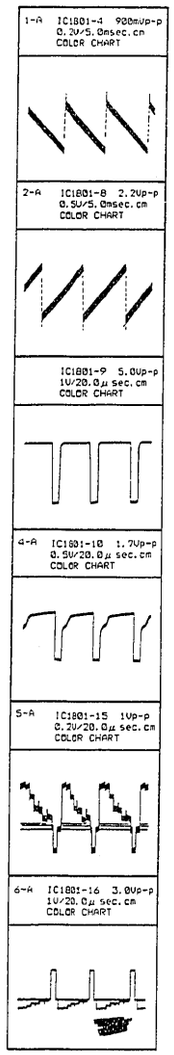
ELECTRONIC VIEWFINDER (EVF) SCHEMATIC DIAGRAM



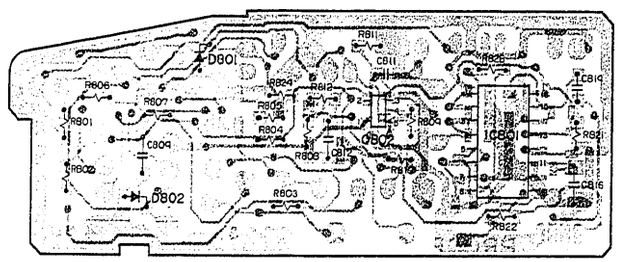
ELECTRONIC VIEWFINDER (EVF) P. C. B

CS801
CRT
SOCKET

WAVEFORMS

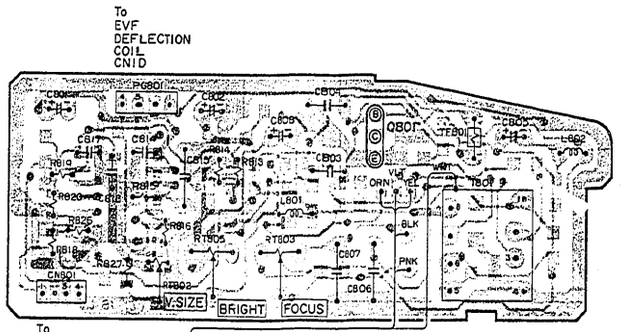


ELECTRONIC VIEWFINDER (EVF) CIRCUIT BOARD DIAGRAM



NOTE : ADD 1000 TO ALL CIRCUIT NUMBERS IN CAMERA SECTION. (FOR EXAMPLE, READ R123 IS R1123 IN PARTS LIST.)

ELECTRONIC VIEWFINDER (EVF) P.C.B



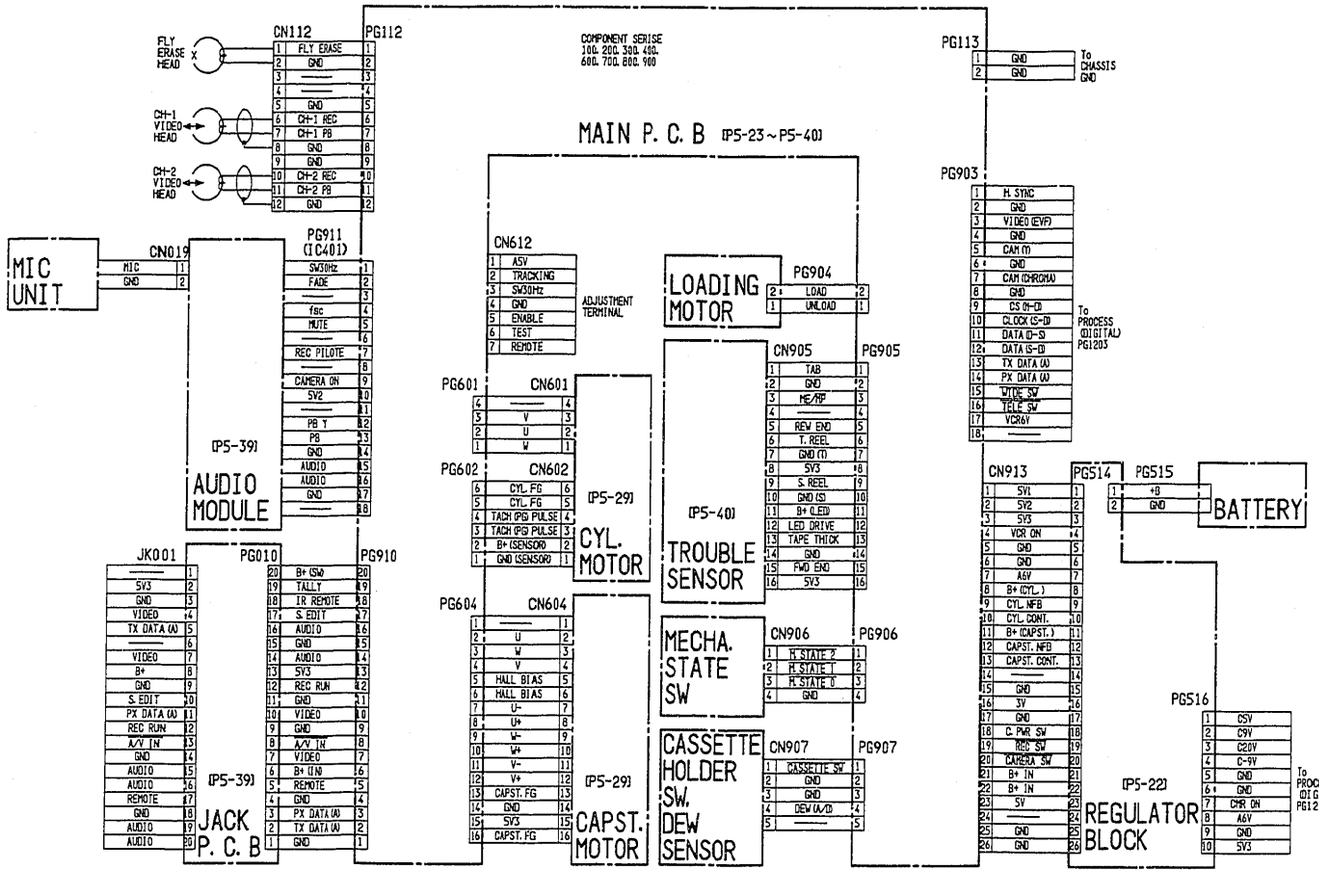
ELECTRONIC VIEWFINDER (EVF) P.C.B

CS801

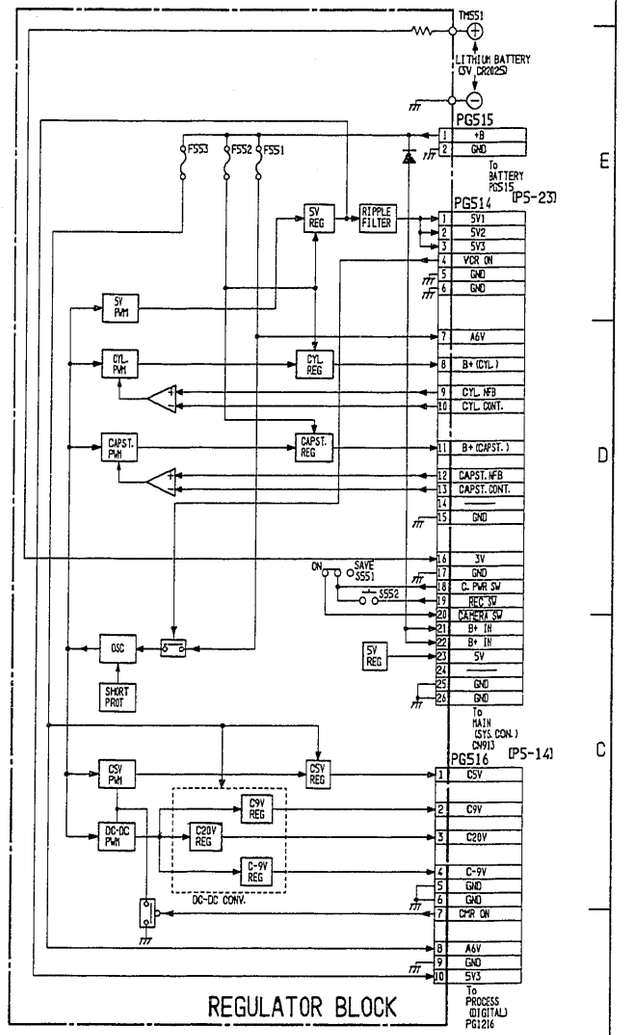
VLT	7
BLK	6
ORN	5
PNK	4
YEL	3
WHT	1

NOTE : ADD 1000 TO ALL CIRCUIT NUMBERS IN CAMERA SECTION. (FOR EXMPLE, READ R123 IS R1123 IN PARTS LIST.)

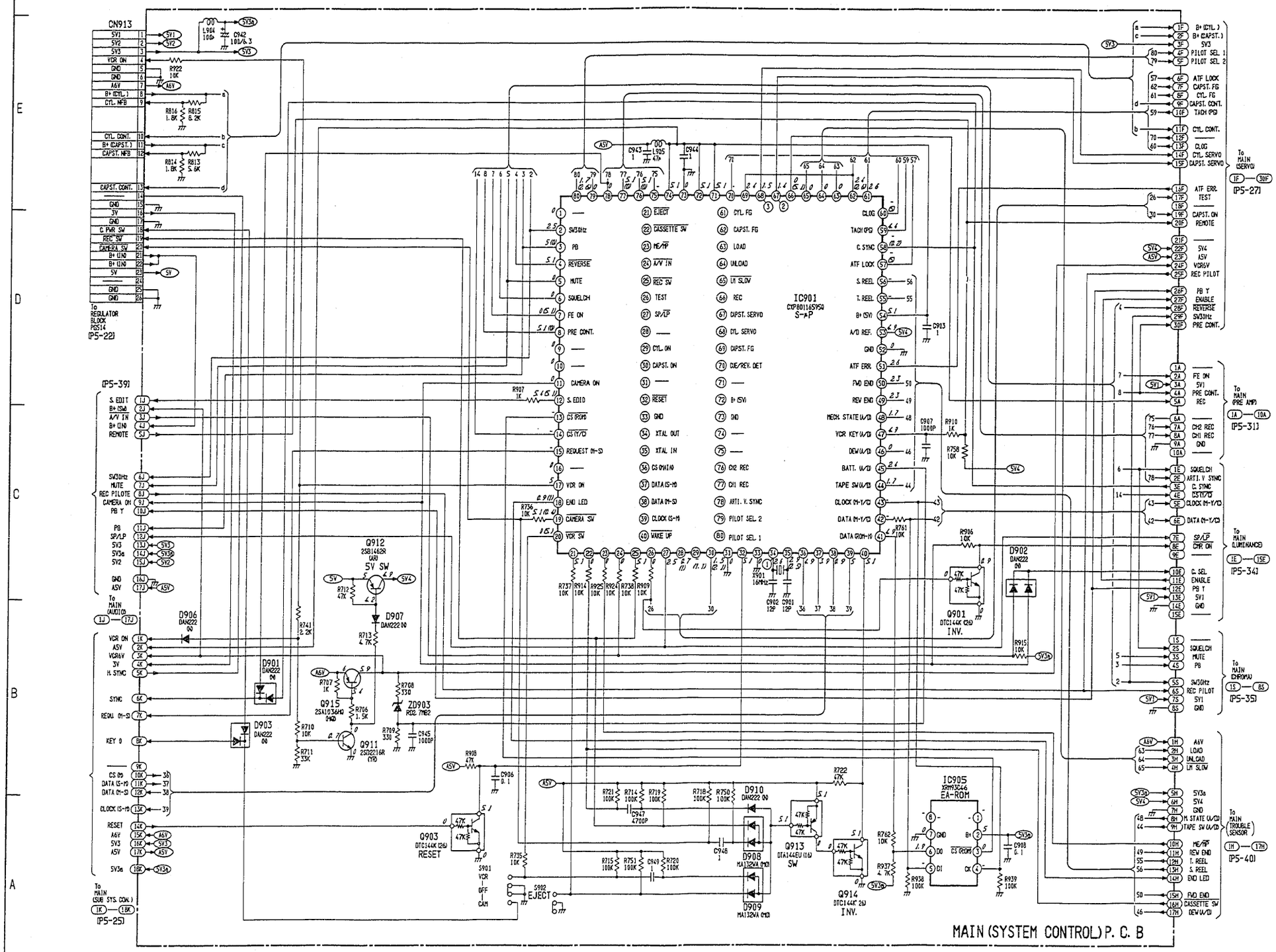
INTERNAL WIRING DIAGRAM (VCR)



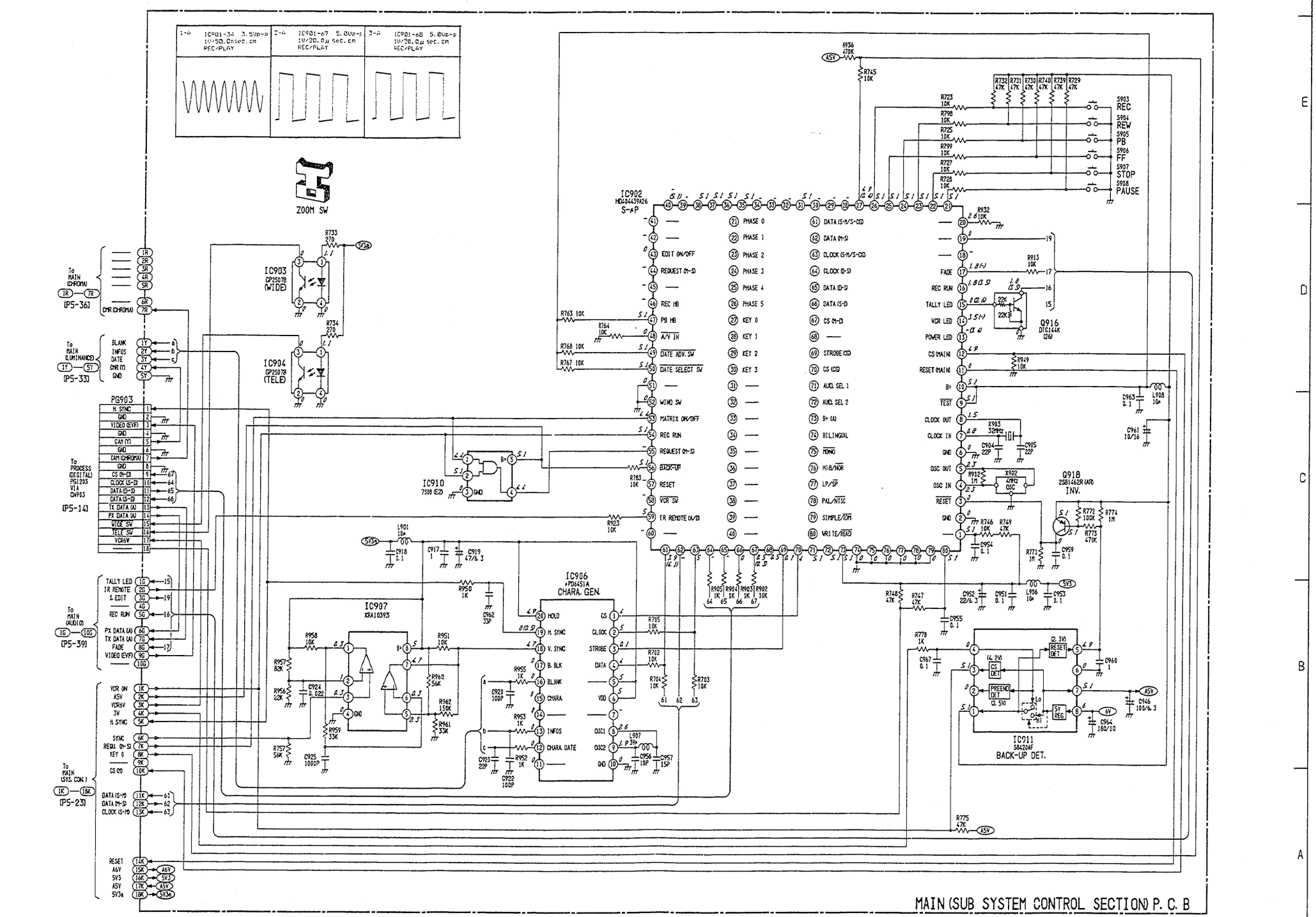
REGULATOR BLOCK DIAGRAM



MAIN (SYSTEM CONTROL SECTION) SCHEMATIC DIAGRAM

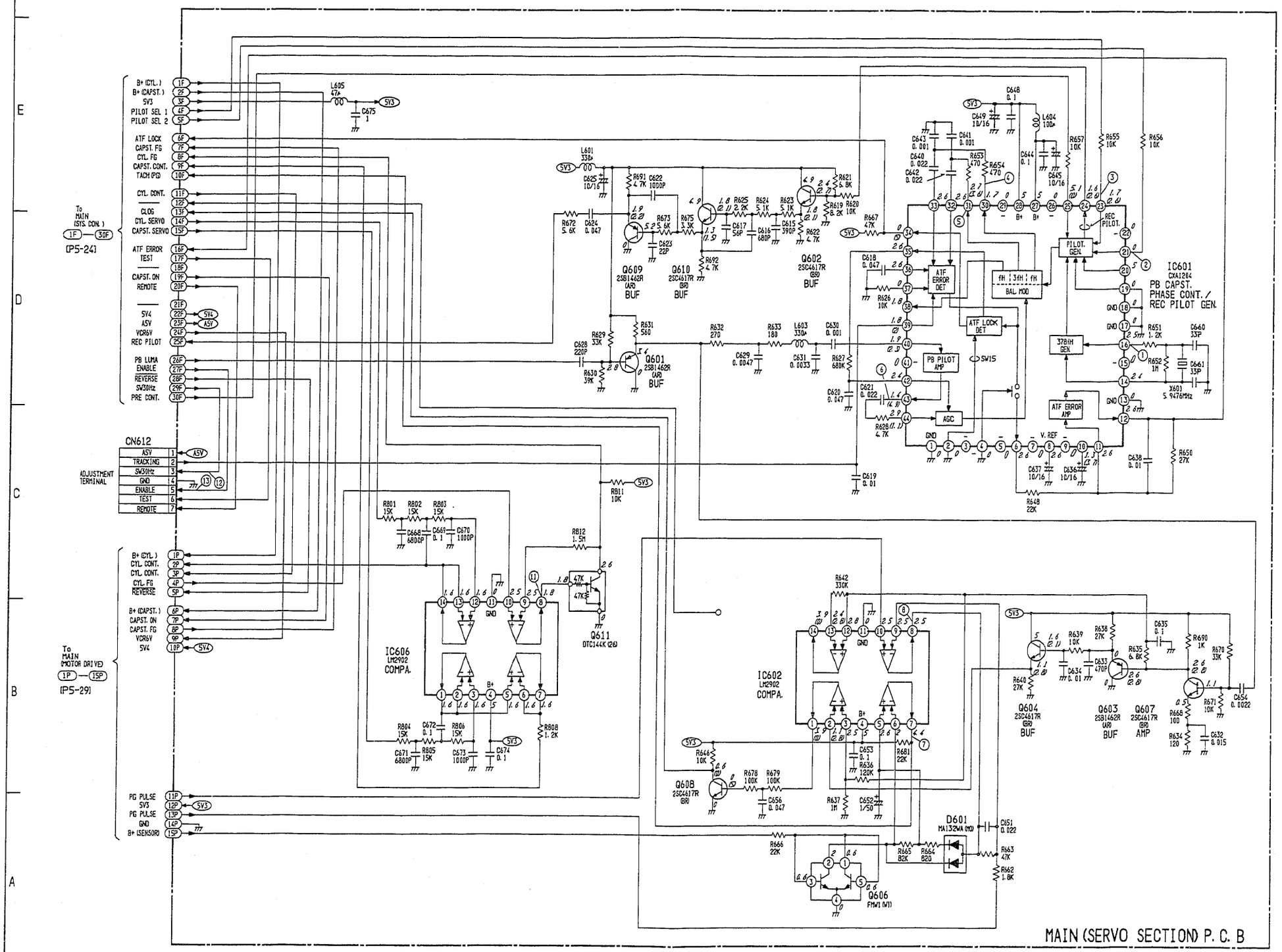


MAIN (SUB SYSTEM CONTROL SECTION) SCHEMATIC DIAGRAM



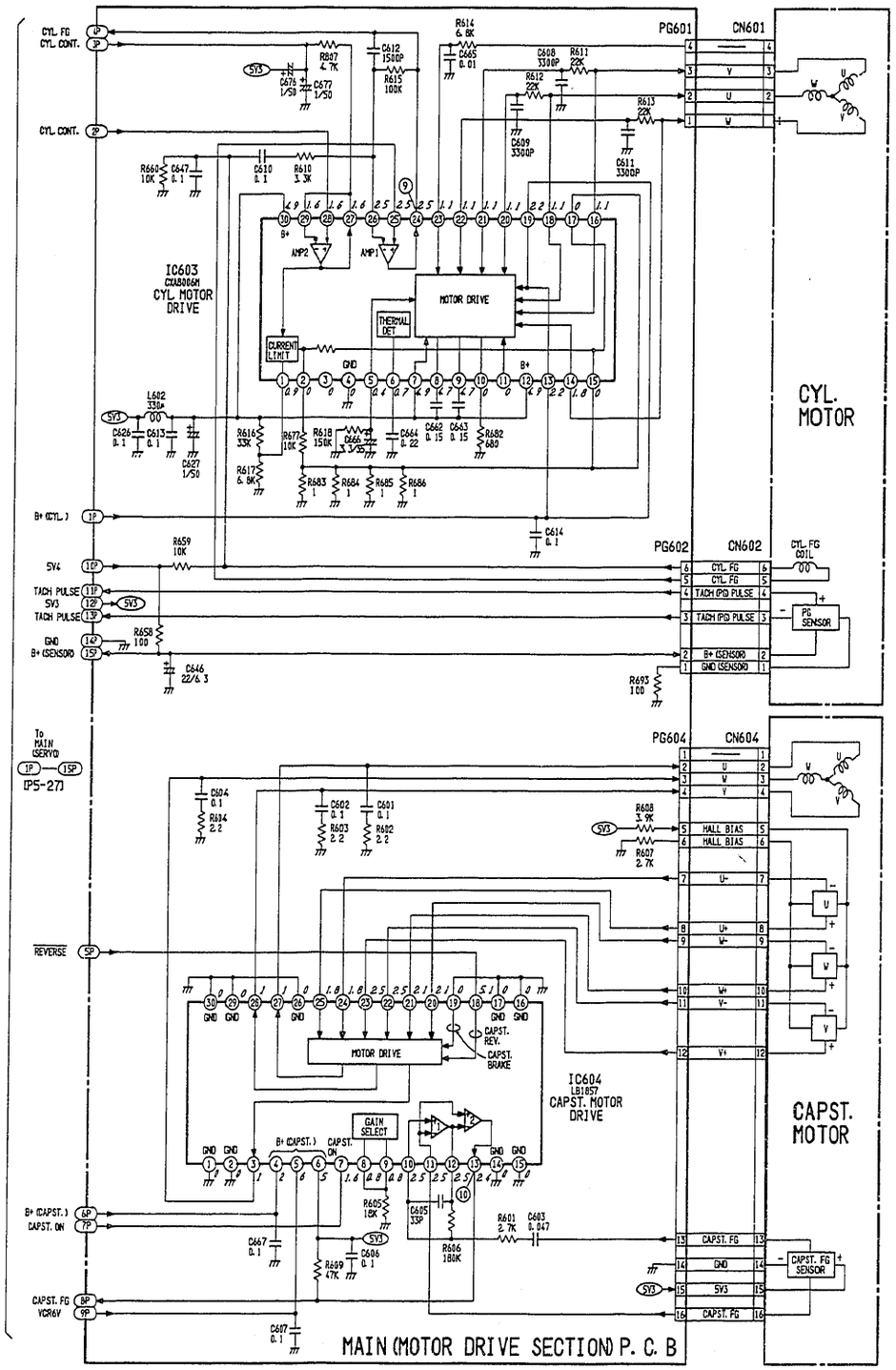
SUB SYSTEM CONTROL 5-25 5-26 SUB SYSTEM CONTROL

MAIN (SERVO SECTION) SCHEMATIC DIAGRAM

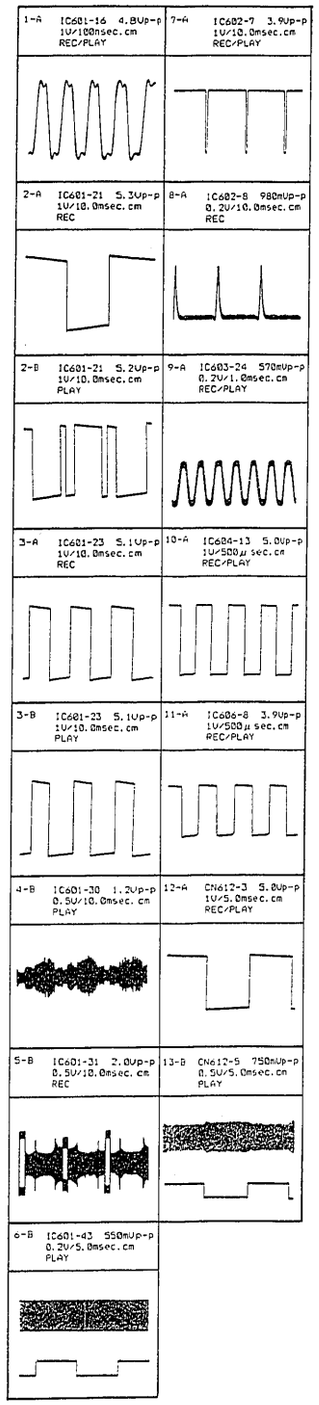


MAIN (SERVO SECTION) P. C. B

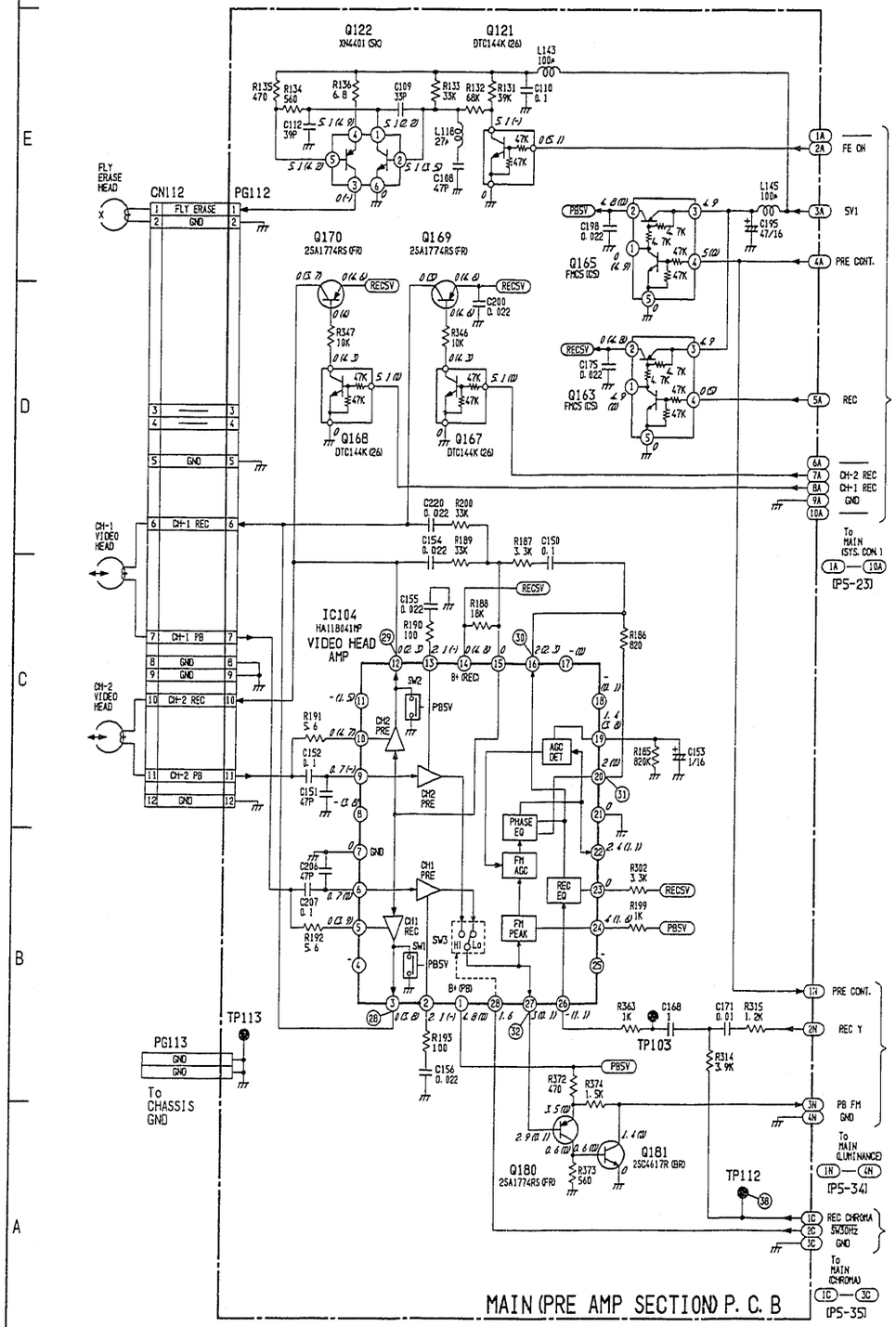
MAIN (MOTOR DRIVE SECTION) SCHEMATIC DIAGRAM



SERVO WAVEFORMS


1-A IC601-16 4.8Vp-p 1V/100nsec.cm REC/PLAY
7-A IC602-7 3.9Vp-p 1V/10.0msec.cm REC/PLAY
2-A IC601-21 5.3Vp-p 1V/10.0msec.cm REC
8-A IC602-8 980mVp-p 0.2V/10.0msec.cm REC
2-B IC601-21 5.2Vp-p 1V/10.0msec.cm PLAY
9-A IC603-24 570mVp-p 0.2V/1.0msec.cm REC/PLAY
3-A IC601-23 5.1Vp-p 1V/10.0msec.cm REC
10-A IC604-13 5.0Vp-p 1V/500μsec.cm REC/PLAY
3-B IC601-23 5.1Vp-p 1V/10.0msec.cm PLAY
11-A IC606-8 3.9Vp-p 1V/500μsec.cm REC/PLAY
4-B IC601-30 1.2Vp-p 0.5V/10.0msec.cm PLAY
12-A CN612-3 5.0Vp-p 1V/5.0msec.cm REC/PLAY
5-B IC601-31 2.0Vp-p 0.5V/10.0msec.cm REC
13-B CN612-5 750mVp-p 0.5V/5.0msec.cm PLAY
6-B IC601-43 550mVp-p 0.2V/5.0msec.cm PLAY

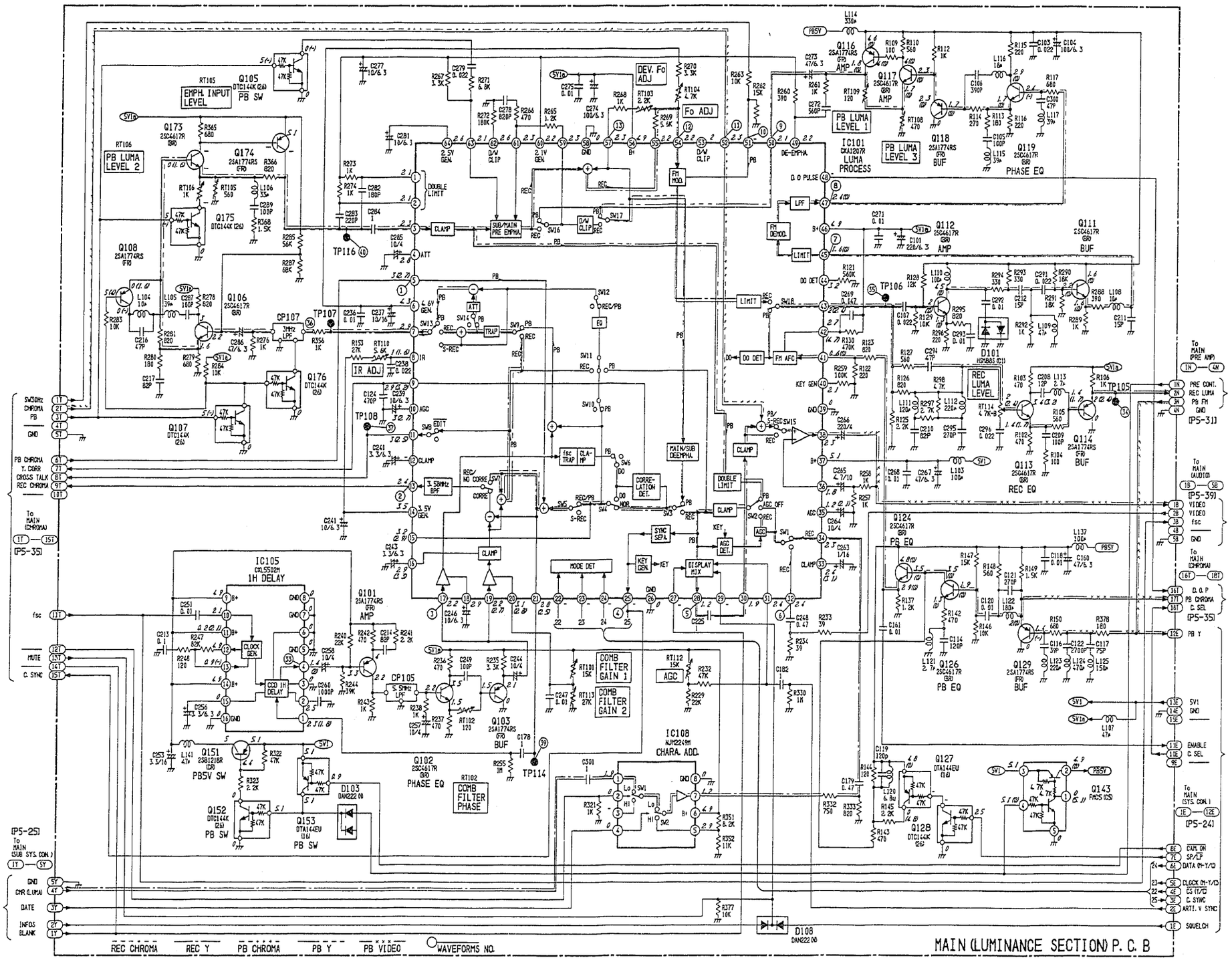
MAIN (PRE AMP SECTION) SCHEMATIC DIAGRAM



LUMINANCE/CHROMA WAVEFORMS

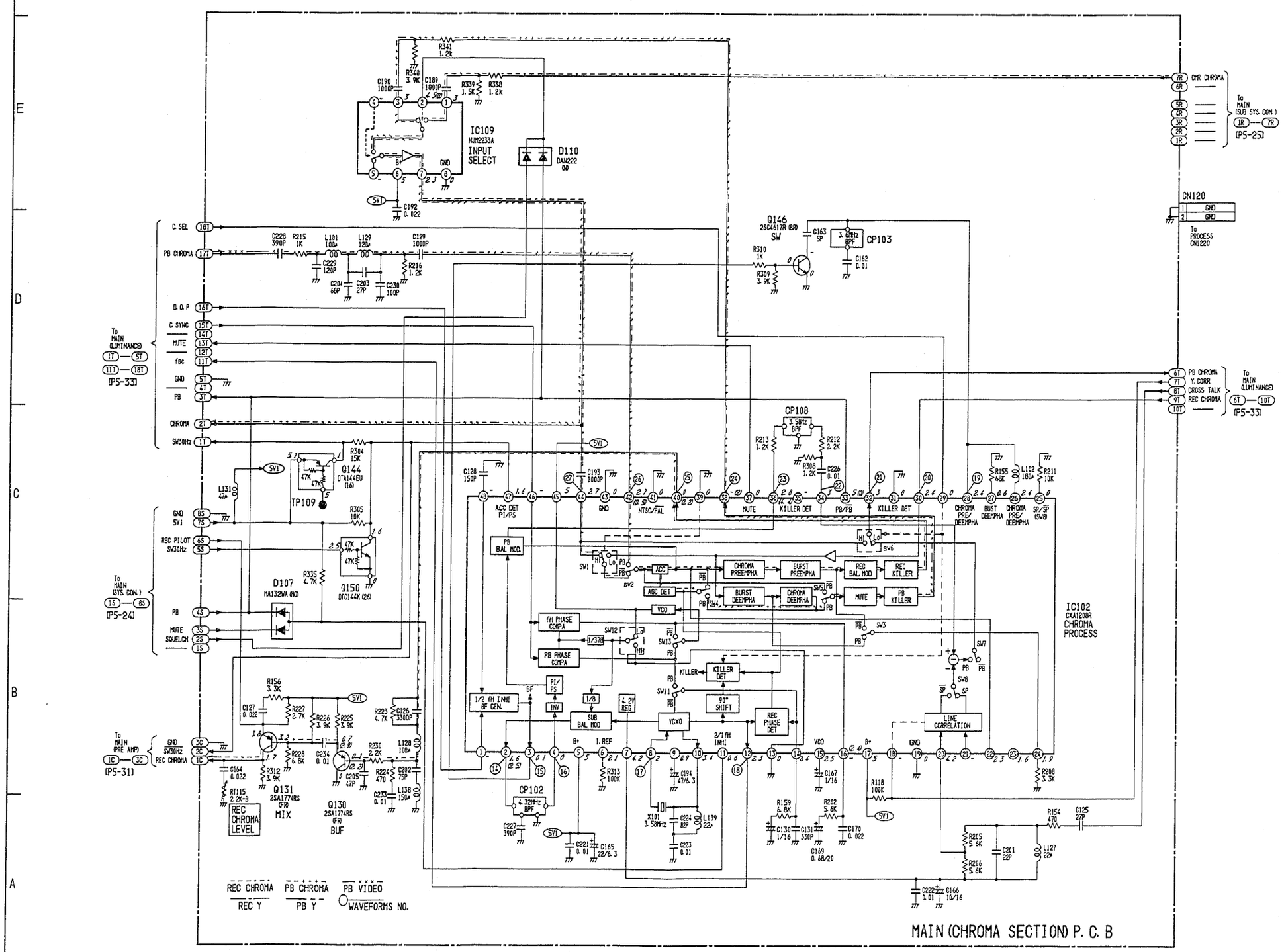
1C101-5 300mVp-p 0.1V/20.0μ sec.cm PLAY	6-A 1C101-32 430mVp-p 0.1V/20.0μ sec.cm REC/PLAY	13-A 1C101-57 190mVp-p 50mV/20.0μ sec.cm REC	20-A 1C102-30 120mVp-p 50mV/20.0μ sec.cm REC	26-B 1C102-42 280mVp-p 0.1V/20.0μ sec.cm PLAY	33-B 1C105-4 530mVp-p 0.2V/20.0μ sec.cm PLAY	40-A TP116 370mVp-p 0.1V/20.0μ sec.cm REC
2-A 1C101-13 120mVp-p 50mV/20.0μ sec.cm REC	7-B 1C101-45 250mVp-p 0.1V/5.0msec.cm PLAY	13-B 1C101-57 260mVp-p 0.1V/20.0μ sec.cm PLAY	20-B 1C102-30 280mVp-p 0.1V/20.0μ sec.cm PLAY	27-B 1C102-44 280mVp-p 0.1V/20.0μ sec.cm PLAY	34-A TP105 500mVp-p 0.2V/5.0msec.cm REC	40-B TP116 520mVp-p 0.1V/20.0μ sec.cm PLAY
2-B 1C101-13 300mVp-p 0.1V/20.0μ sec.cm PLAY	8-B 1C101-47 160mVp-p 50mV/20.0μ sec.cm PLAY	14-A 1C102-2 680mVp-p 0.2V/20.0μ sec.cm REC/PLAY	21-B 1C102-32 300mVp-p 0.1V/20.0μ sec.cm PLAY	28-A 1C104-3 3.9Vp-p 2V/5.0msec.cm REC	35-A TP106 520mVp-p 0.2V/5.0msec.cm REC	
3-A 1C101-17 450mVp-p 0.1V/20.0μ sec.cm REC	9-B 1C101-50 160mVp-p 50mV/20.0μ sec.cm PLAY	15-A 1C102-3 1.7Vp-p 0.5V/20.0μ sec.cm REC/PLAY	22-B 1C102-34 190mVp-p 0.1V/20.0μ sec.cm PLAY	29-A 1C104-12 3.9Vp-p 2V/5.0msec.cm REC	35-B TP106 600mVp-p 0.2V/5.0msec.cm PLAY	
3-B 1C101-17 500mVp-p 0.1V/20.0μ sec.cm PLAY	10-A 1C101-51 1.2Vp-p 0.1V/5.0msec.cm REC/PLAY	16-A 1C102-4 180mVp-p 0.1V/20.0μ sec.cm REC/PLAY	23-B 1C102-36 1Vp-p 0.5V/20.0μ sec.cm PLAY	30-A 1C104-16 900mVp-p 0.5V/5.0msec.cm REC	36-A TP107 420mVp-p 0.1V/20.0μ sec.cm REC/PLAY	
4-A 1C101-25 2.5Vp-p 0.5V/20.0μ sec.cm REC/PLAY	11-B 1C101-52 270mVp-p 0.1V/20.0μ sec.cm PLAY	17-A 1C102-8 160mVp-p 50mV/200nsec.cm REC/PLAY	24-A 1C102-38 230mVp-p 0.1V/20.0μ sec.cm REC	31-A 1C104-20 800mVp-p 0.5V/5.0msec.cm REC	37-A TP108 430mVp-p 0.1V/20.0μ sec.cm REC/PLAY	
5-A 1C101-28 420mVp-p 0.1V/20.0μ sec.cm REC	12-A 1C101-54 50mVp-p 50mV/5.0msec.cm REC	18-A 1C102-12 440mVp-p 0.1V/200nsec.cm REC/PLAY	24-B 1C102-38 330mVp-p 0.1V/20.0μ sec.cm PLAY	32-B 1C104-22 280mVp-p 0.1V/5.0msec.cm PLAY	38-A TP112 230mVp-p 0.1V/20.0μ sec.cm REC	
5-B 1C101-28 500mVp-p 0.1V/20.0μ sec.cm PLAY	12-B 1C101-54 160mVp-p 50mV/20.0μ sec.cm PLAY	19-A 1C102-28 950mVp-p 0.2V/20.0μ sec.cm REC/PLAY	25-A 1C102-40 470mVp-p 0.2V/20.0μ sec.cm REC	33-A 1C105-4 470mVp-p 0.1V/20.0μ sec.cm REC	39-A TP114 430mVp-p 0.1V/20.0μ sec.cm REC/PLAY	

MAIN (LUMINANCE SECTION) SCHEMATIC DIAGRAM

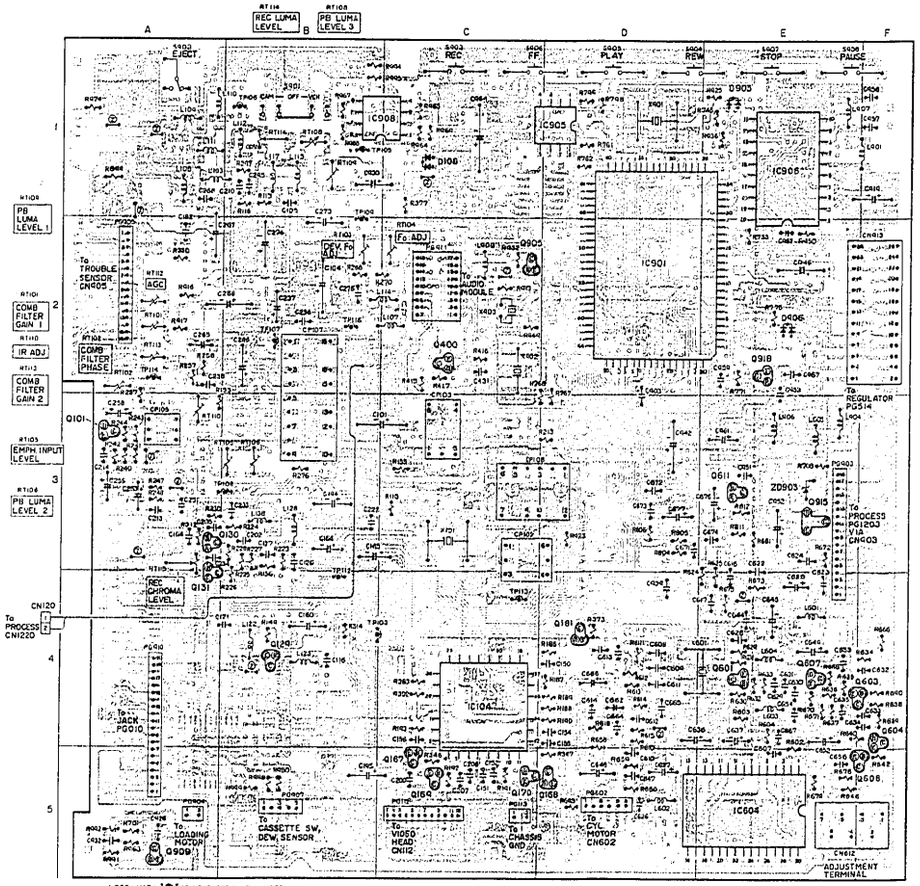


LUMINANCE 5-33 5-34 LUMINANCE

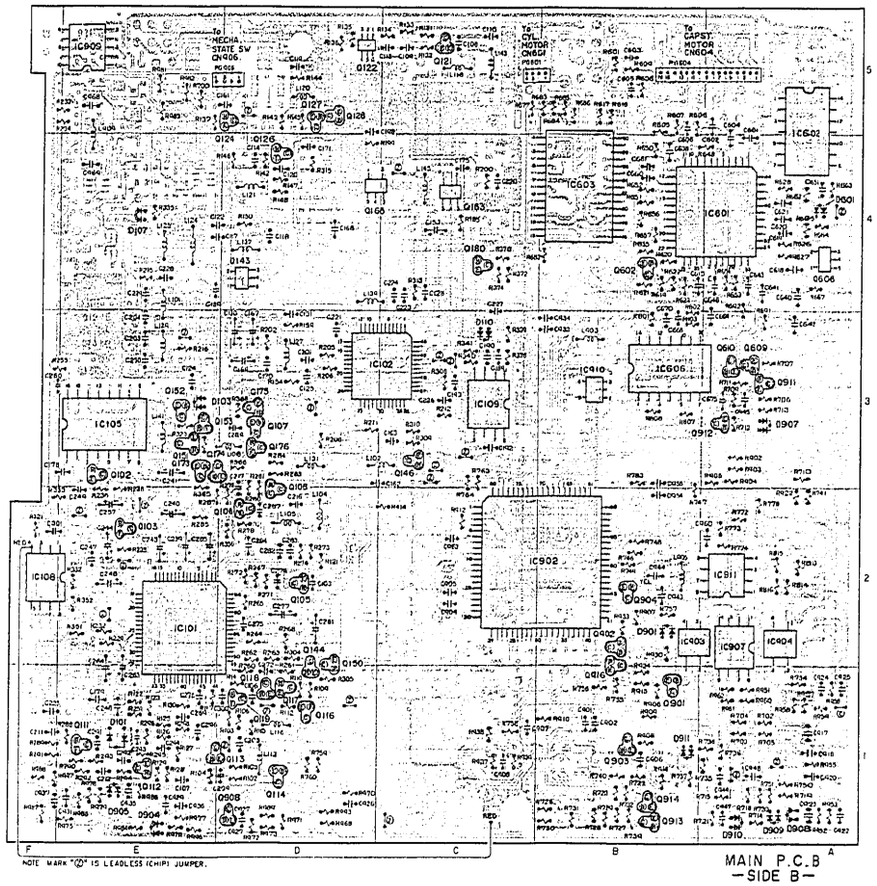
MAIN (CHROMA SECTION) SCHEMATIC DIAGRAM



MAIN CIRCUIT BOARD DIAGRAM

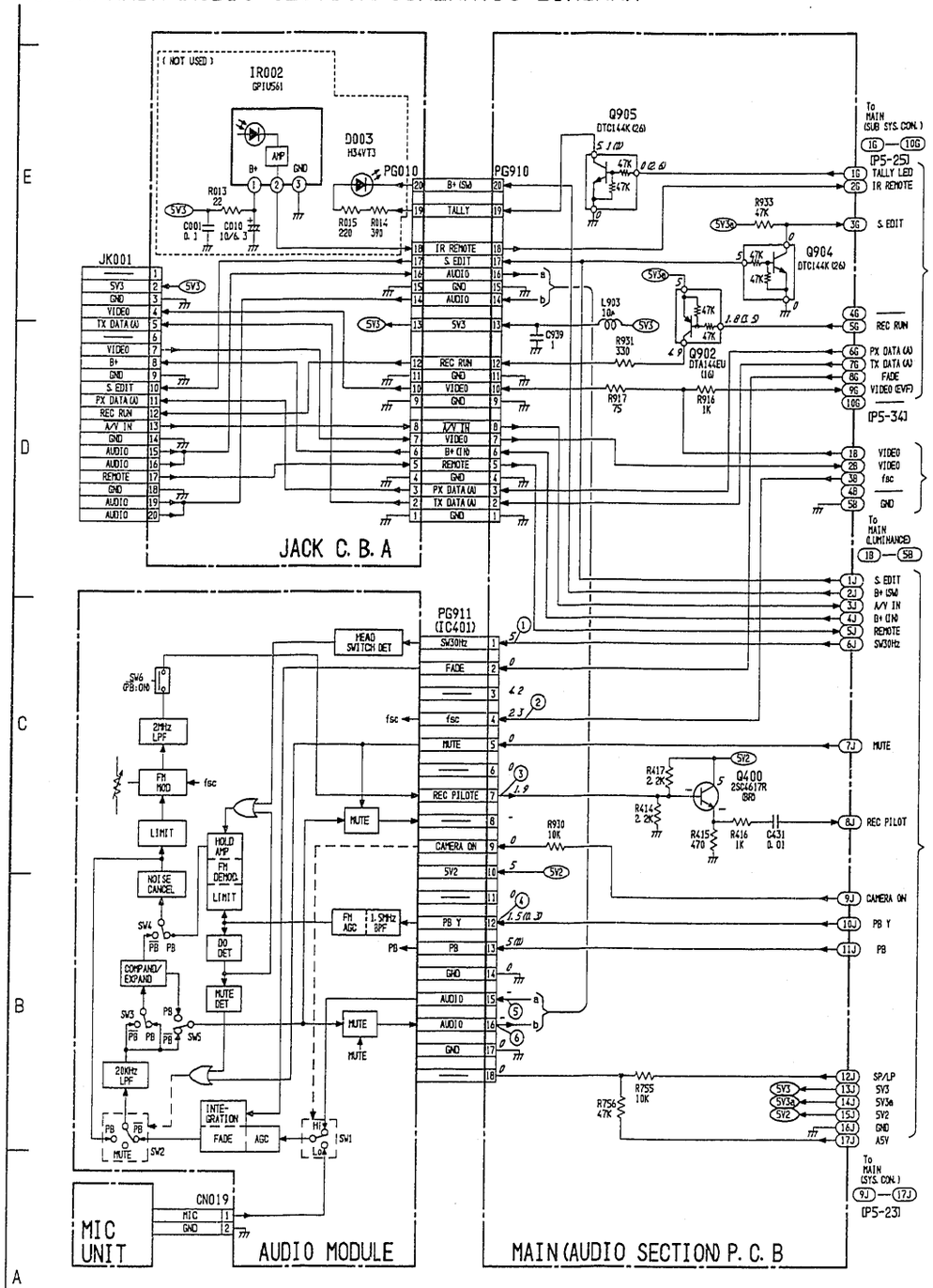


MAIN P.C.B
-SIDE A-

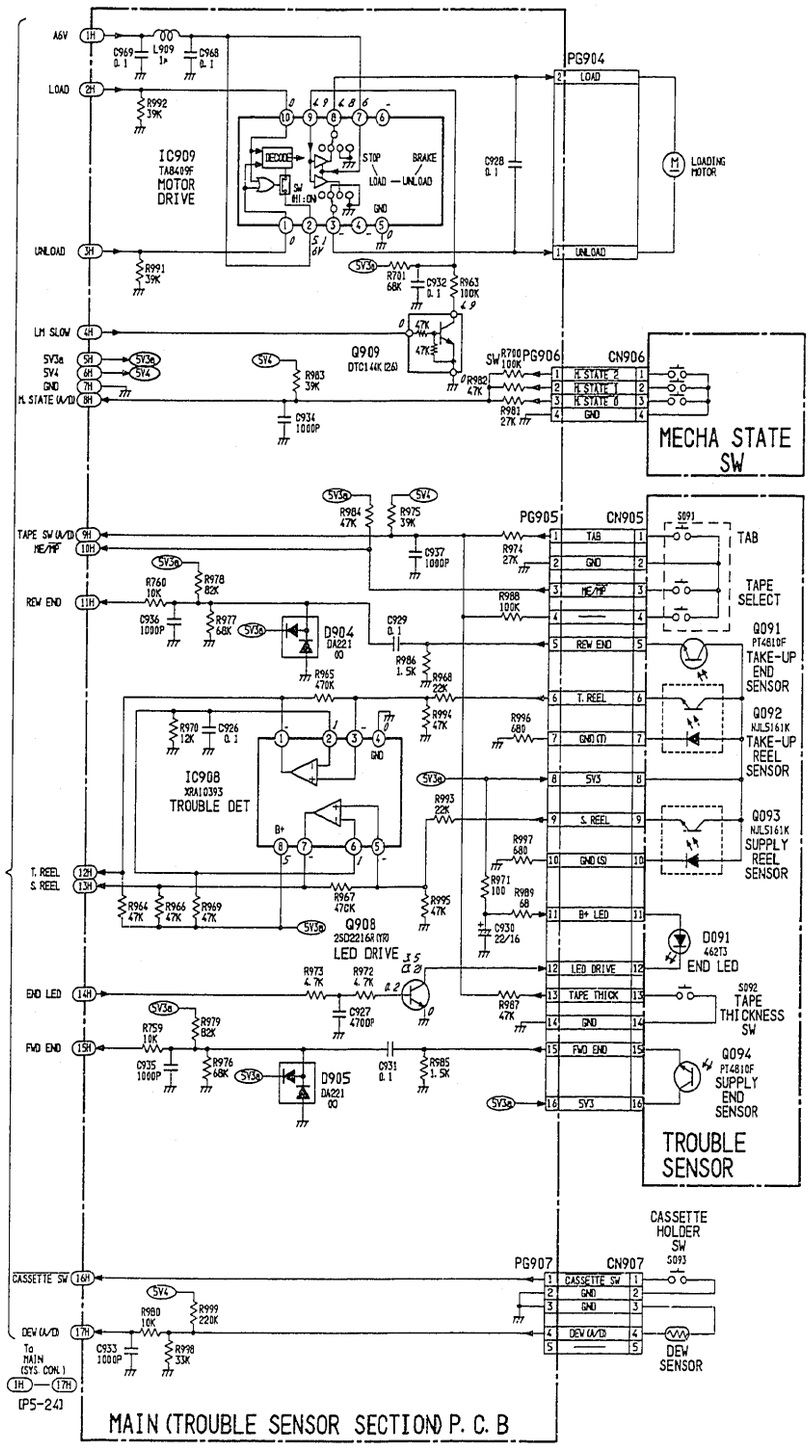


MAIN P.C.B
-SIDE B-

JACK. MAIN (AUDIO SECTION) SCHEMATIC DIAGRAM

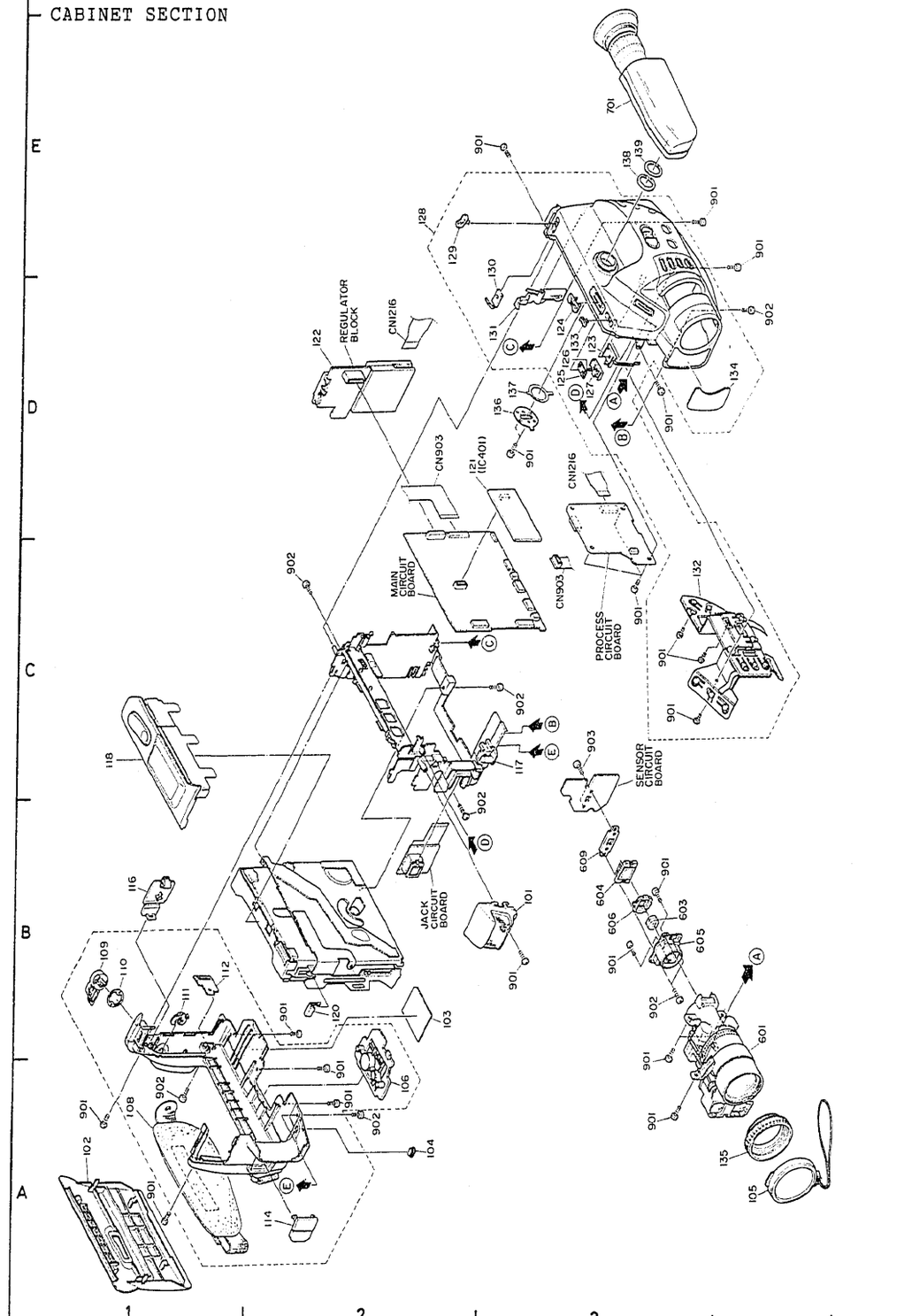


MAIN (TROUBLE SENSOR SECTION) SCHEMATIC DIAGRAM

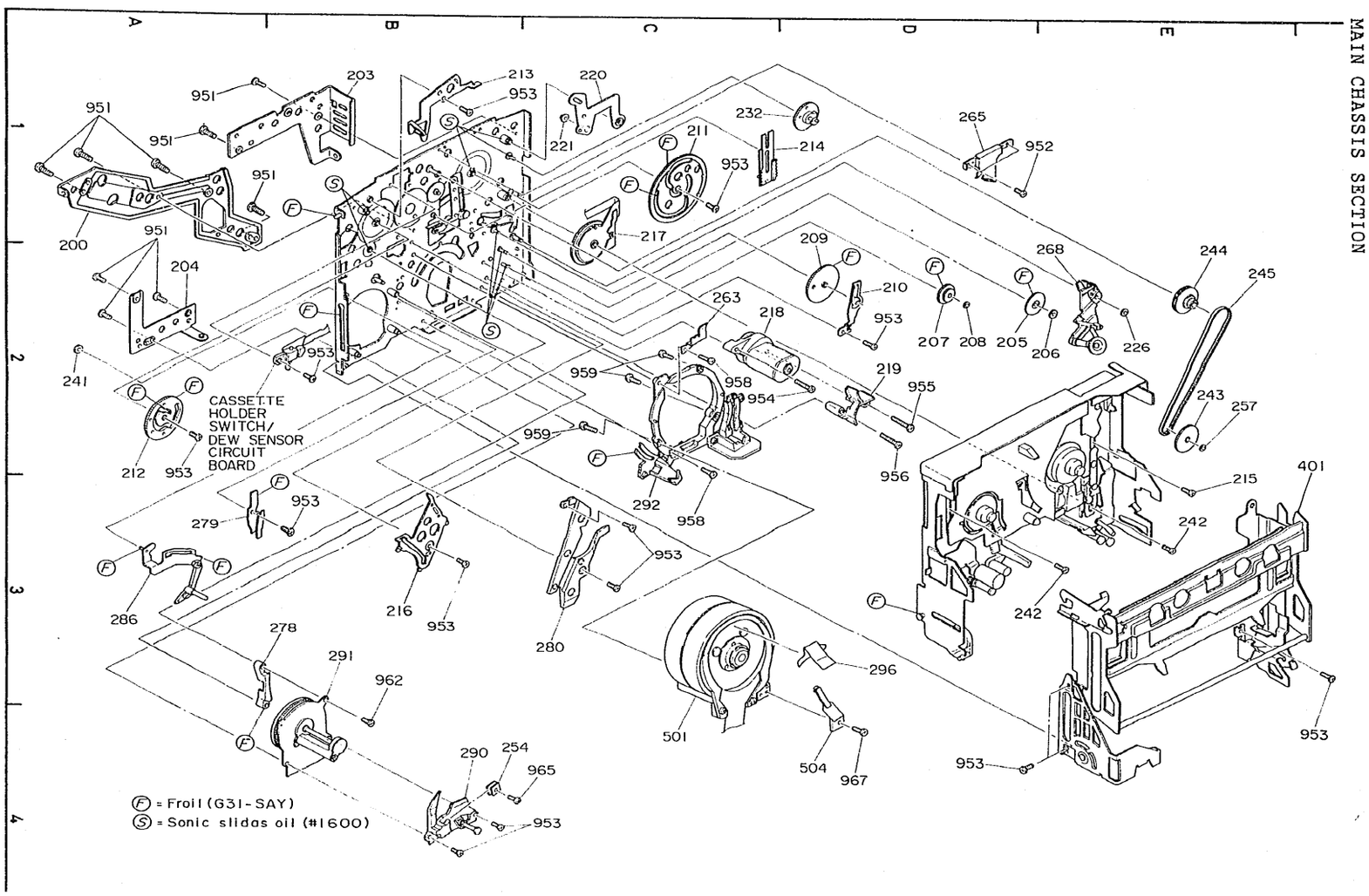


CHAPTER 6
EXPLODED VIEWS

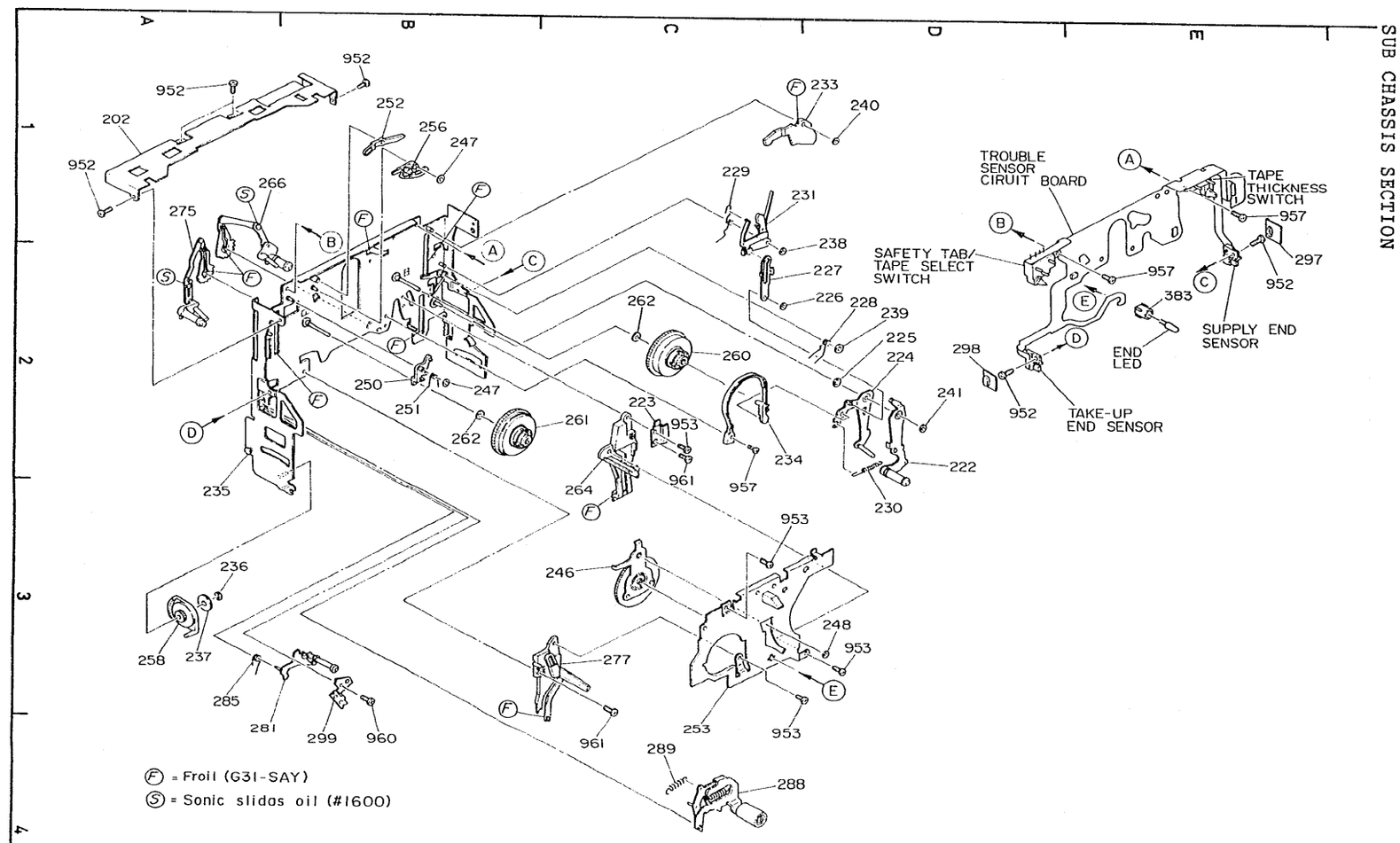
CABINET SECTION



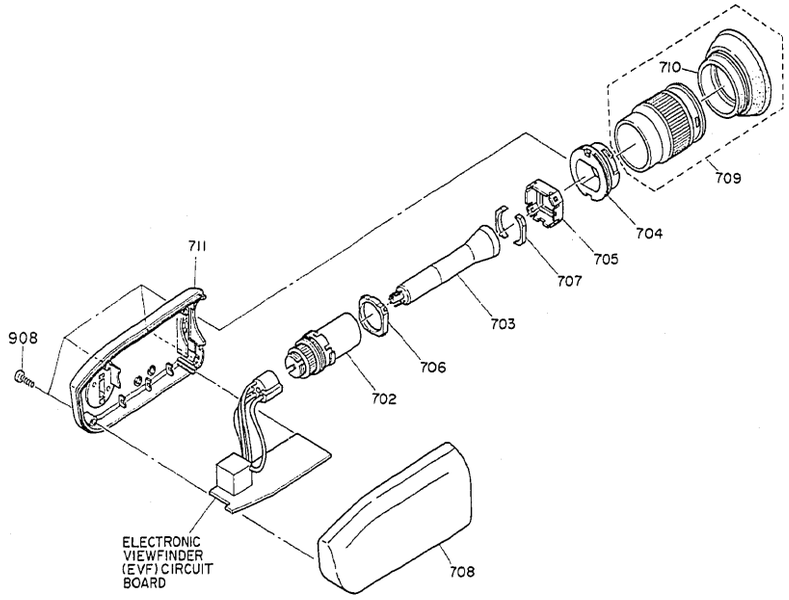
MAIN CHASSIS SECTION



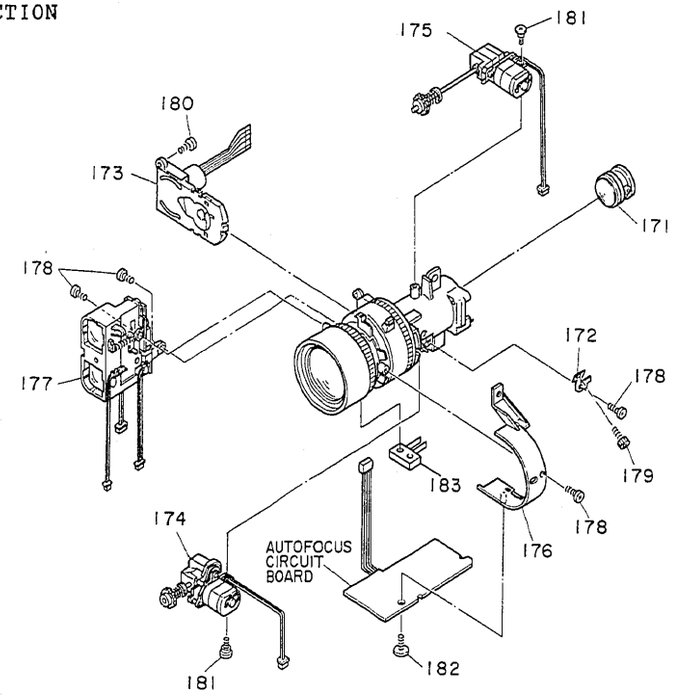
SUB CHASSIS SECTION



ELECTRONIC VIEWFINDER (EVF) SECTION



LENS SECTION



SCREWS USED

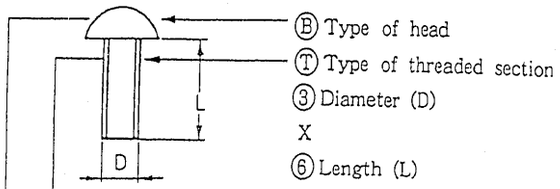
SYMBOL No.	CONFIGURATION (COLOR)	DIMENSION (mm)
215	(BLOCK)	P 1.4x2
242	(BLACK)	P 1.4x2
901	(BLACK)	BT 2x5
902	(BLACK)	B 2x3
903		BT 2x3
908	(BLACK)	BT 2x5
951	(BLACK)	P 1.4x2
952	(SILVER)	P 1.4x1.6
953		P 1.4x1.8
954	(SILVER)	P 1.4x6
955		P 1.4x12
956		P 1.7x12
957	(BLACK)	P 1.4x2.5
958	(SILVER)	P 1.7x4
959	(BLACK)	P 2x4
960	(BLACK)	P 1.4x1.2
961		P 1.4x2
962	(SILVER)	P 1.4x2
965		P 1.7x3
967	(BLACK)	P 2x4

WASHERS USED

SYMBOL No.	DIMENSION (mm)	SLIT
206	O.D.:3.6/I.D.:1.2/t:0.25	No
208	O.D.:3.0/I.D.:1.2/t:0.25	No
225	O.D.:2.5/I.D.:0.8/t:0.13	Yes
226	O.D.:3.2/I.D.:1.2/t:0.25	Yes
238	O.D.:3.6/I.D.:1.2/t:0.13	Yes
239	O.D.:4.0/I.D.:1.7/t:0.25	Yes
240	O.D.:3.6/I.D.:1.4/t:0.25	No
241	O.D.:2.5 /I.D.:0.8/t:0.13	Yes
247	O.D.:3.6/I.D.:1.0/t:0.25	No
248	O.D.:1.8/I.D.:0.8/t:0.13	Yes
257	O.D.:2.5/I.D.:0.8/t:0.25	No
262	O.D.:5.0/I.D.:2.7/t:0.25	No

SCREW CLASSIFICATION

Example : BT3 × 6

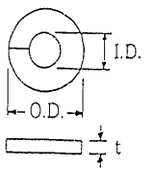


Abbre-viation	Name	Shape
No symbol	Brazier head	
P	Pan head	
B	Binding head	
O	Oval countersunk head	
F	Flat countersunk head	

Abbre-viation	Name	Shape
No symbol	Machine (clamps without tapping)	
t	Tapping (clamps with tapping) Type 1	
T	Tapping (clamps with tapping) Type 2	
f	Forming tight (for metal)	

Note Since the forming tight screw tightens while self tapping machine screws can be replaced by tapping screws.

WASHER CLASSIFICATION



LUBLICATION

Lubrication points are shown in the exploded view diagrams by marks (Ⓢ, Ⓕ).

Lubricants shown in the diagram are as follows.

Ⓢ Sonic slider oil (#1600)

Ⓕ Froil (G31-SAY)

CHAPTER 7 REPLACEMENT PARTS LEST

SYMBOL-NO	P-NO	DESCRIPTION
		FOR FINAL ASSEMBLY
101	5422533	MICROPHONE
102	4730702	DOOR, CASSETTE
104	6598793	CAP, AF
105	6444562	CAP, HOOD
106	6444382	HOLDER, TRIPPOD
107	4713933	CASE, SIDE(R)
108	7743732	STRAP, HAND
109	4751252	KNOB, TRIGGER
110	6528752	SPRING
111	6816311	HOLDER, KNOB
112	7797031	BRACKET
114	4722091	COVER, CONNECTOR
116	6487486	LID, BATTERY
117	6186232	FRAME
118	4714022	BUTTON, T/W
120	6810901	HOLDER, FLEXIBLE
121	1390331	PWB ASSY HTS9535
122	1390281	PWB ASSY HTS9301
123	6444321	HOLDER, KNOB
124	4750445	COVER, KNOB
125	4750451	KNOB, POWER
126	6305731	SPRING
127	6444331	HOLDER, KNOB
128	4713852	CASE, SIDE(L)
129	4750297	KNOB, EJECT
130	6816321	HOLDER, KNOB
131	6407862	LEVER
132	5617251	SWITCH UNIT
133	4751243	KNOB, EJECT
134	6444291	COVER, IR FILTER
135	6444311	HOOD, LENS
136	7406792	PLATE
137	7406801	PLATE
138	4343481	WASHER
139	6594501	WASHER
171	6961462	LENS, REAR
172	6961463	HOLDER
173	6961464	IRIS BLOCK
174	6961465	MOTOR, ZOOM
175	6961466	MOTOR, AUTO FOCUS
176	6961467	COVER
177	6961469	AUTO FOCUS BLOCK
178	6961471	SCREW(1.7X4)
179	6961472	SCREW
180	6961473	SCREW(1.7X5.5)
181	6961474	SCREW
182	6961475	SCREW(1.7X3.5)
183	6961468	SWITCH
200	4581562	BRACKET
202	7473854	HOLDER
203	4581431	BRACKET
204	4581421	BRACKET
205	6347851	GEAR
206	7786213	WASHER
207	6347862	GEAR
208	7784687	WASHER
209	6916383	GEAR
210	7472722	HOLDER, GEAR
211	6349291	GEAR
212	6347882	GEAR
213	4580871	ARM, EJECT
214	4581652	RUCK
215	4523781	SCREW
216	4580893	ARM, OPERATION
217	5610863	SWITCH, MODE
218	5579301	MOTOR, LOADING
219	6822651	GUIDE
220	4581642	SLIDER
221	4522772	ROLLER
222	4581281	ARM
223	7472736	STOPPER
224	4581241	ARM
225	4340245	WASHER
226	7787571	WASHER
227	7472894	ARM
228	6553131	SPRING
229	6556433	SPRING
230	6558461	SPRING
231	4582211	ARM
232	6440371	CAM, BRAKE
233	6821274	BRAKE
234	7472712	BAND, TENTION
235	7139141	CHASSIS, SUB
236	7774942	E RING
237	6529861	SPRING
238	4340248	WASHER
239	77875753	POLYSLIDER WASHER
240	4340249	WASHER
241	4340245	WASHER
242	4523783	SCREW
243	6440362	GEAR
244	6441241	GEAR
245	6359051	BELT
246	6500731	IDLER
247	4340243	WASHER
248	4340242	WASHER
250	6821184	ARM
251	6553191	SPRING
252	6821263	ARM
253	4580695	PLATE
254	7474974	BRACKET
256	6821234	ARM
257	4340241	WASHER
258	4581631	DAMPER
260	6416572	REEL, SUPPLY
261	6416571	REEL, TAKE UP
262	4343851	WASHER
263	6528984	PLATE
264	6821333	RAIL, GUIDE
265	7473366	HOLDER, ARM
266	6916693	BASE, GUIDE
268	6916993	ARM, GUIDE ROLLER
275	6916701	BASE, GUIDE ROLLER(O)
277	6821077	PLATE, GUIDE
278	6821095	RAIL, GUIDE ROLLER
279	6821104	RAIL
280	6821112	COVER
281	4581321	ARM
285	6553081	SPRING
286	4581311	ARM
288	4581181	ARM, PRESSURE ROLLER
289	6556732	SPRING
290	6822902	BASE, OPERATION
291	1470071	MOTOR, CAPSTAN
292	6916642	BASE, CYLINDER
296	4341773	HOLDER, TAPE
297	4342381	SPACER

SYMBOL-NO	P-NO	DESCRIPTION
298	4343161	SPACER
299	4581232	HOLDER
383	6821222	HOLDER, LED
401	4580761	CASSETTE HOLDER ASSY
501	5436561	CYLINDER ASSY (CY-53CD-F)
504	5793831	BRUSH
601	6961312	LENS, ZOOM
603	5783251	FILTER
604	5318411	IC ICX044BK (CCD IMAGE DEVICE)
605	6816351	COVER
606	6408031	RUBBER
609	4898251	PLATE
701	7057392	EVF UNIT
702	5242112	DEFLECTION YOKE
⚠703	5319051	CRT(M01KQM07WB)
704	6810931	HOLDER, NECK
705	4721402	COVER
706	6815812	HOLDER, CRT
707	6594411	RUBBER
708	4713982	CASE, FRONT
709	4711156	LENS, EVF
710	6443301	CAP, EYE
711	4713991	CASE, BOTTOM
901	7775945	SCREW(2X5)
902	7775963	SCREW(2X3)
903	8650103	SCREW (2X3)
908	7775945	SCREW(2X5)
951	7775921	SCREW(1.4X2)
952	7775911	SCREW(1.4X1.6)
953	7775912	SCREW(1.4X1.8)
954	8712974	SCREW(1.4X6)
955	7773531	SCREW
956	7773541	SCREW
957	7775922	SCREW(1.4X2.5)
958	8700270	SCREW(1.7X4)
959	87111043	SCREW 2X4
960	8714027	SCREW(1.4X1.2)
961	7775913	SCREW (1.4X2.0)
962	8712904	SCREW (1.4X2.0)
965	7773711	SCREW
967	7783153	SCREW(2X4)
		FOR ACCESSORIES
	4130965	AC, ADAPTOR
	5858854	CORD, RF
	4131694	RF CONVERTER
	5860782	CORD, AV OUTPUT
	4131502	POWER CORD
	4131015	STRAP, SHOULDER
	7035329	CASE, CARRING
		VTR SECTION
C 103	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 105	0893162	CERAMIC CHIP 100PF+-5% 50V
C 106	0893169	CERAMIC CHIP 390PF+-5% 50V
C 107	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 108	0893122	CERAMIC CHIP 47PF+-5% 50V
C 109	0893119	CERAMIC CHIP 33PF+-5% 50V
C 110	0893232	CERAMIC CHIP 0.1UF+80-20% 25V
C 112	0893121	CERAMIC CHIP 39PF+-5% 50V
C 114	0893163	CERAMIC CHIP 120PF+-5% 50V
C 116	0893156	CERAMIC CHIP 39PF+-5% 50V
C 117	0202158	CERAMIC CHIP 75PF+-5% 50V
C 118	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 119	0893163	CERAMIC CHIP 120PF+-5% 50V
C 120	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 121	0893167	CERAMIC CHIP 270PF+-5% 50V
C 122	0893214	CERAMIC CHIP 2700PF+-10% 50V
C 124	0893171	CERAMIC CHIP 470PF+-5% 50V
C 125	0893154	CERAMIC CHIP 27PF+-5% 50V
C 126	0893215	CERAMIC CHIP 3300PF+-10% 50V
C 127	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 128	0893128	CERAMIC CHIP 150PF+-5% 50V
C 129	0893208	CERAMIC CHIP 1000PF+-10% 50V
C 131	0893168	CERAMIC CHIP 330PF+-5% 50V
C 150	0893232	CERAMIC CHIP 0.1UF+80-20% 25V
C 151	0893157	CERAMIC CHIP 47PF+-5% 50V
C 152	0893232	CERAMIC CHIP 0.1UF+80-20% 25V
C 154	0893197	CERAMIC CHIP 0.022UF+-10% 25V
C 155	0893197	CERAMIC CHIP 0.022UF+-10% 25V
C 156	0893197	CERAMIC CHIP 0.022UF+-10% 25V
C 161	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 162	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 163	0893143	CERAMIC CHIP 5.0PF+-0.25PF 50V
C 164	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 168	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 170	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 171	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 175	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 178	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 179	0893072	CERAMIC CHIP 0.47UF+80-20% 25V
C 182	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 189	0893208	CERAMIC CHIP 1000PF+-10% 50V
C 190	0893208	CERAMIC CHIP 1000PF+-10% 50V
C 192	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 193	0893208	CERAMIC CHIP 1000PF+-10% 50V
C 198	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 200	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 201	0893153	CERAMIC CHIP 22PF+-5% 50V
C 202	0202158	CERAMIC CHIP 75PF+-5% 50V
C 203	0893154	CERAMIC CHIP 27PF+-5% 50V
C 204	0893159	CERAMIC CHIP 68PF+-5% 50V
C 205	0893157	CERAMIC CHIP 47PF+-5% 50V
C 206	0893157	CERAMIC CHIP 47PF+-5% 50V
C 207	0893232	CERAMIC CHIP 0.1UF+80-20% 25V
C 208	0893149	CERAMIC CHIP 12PF+-5% 50V
C 209	0893162	CERAMIC CHIP 100PF+-5% 50V
C 210	0893161	CERAMIC CHIP 82PF+-5% 50V
C 211	0893151	CERAMIC CHIP 15PF+-5% 50V
C 212	0893151	CERAMIC CHIP 15PF+-5% 50V
C 213	0893232	CERAMIC CHIP 0.1UF+80-20% 25V
C 214	0893161	CERAMIC CHIP 82PF+-5% 50V
C 216	0893157	CERAMIC CHIP 47PF+-5% 50V
C 217	0893161	CERAMIC CHIP 82PF+-5% 50V
C 220	0893197	CERAMIC CHIP 0.022UF+-10% 25V
C 221	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 222	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 223	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 224	0893161	CERAMIC CHIP 82PF+-5% 50V
C 225	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 226	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 227	0893134	CERAMIC CHIP 390PF+-5% 50V
C 228	0893169	CERAMIC CHIP 390PF+-5% 50V
C 229	0893163	CERAMIC CHIP 120PF+-5% 50V
C 230	0893162	CERAMIC CHIP 100PF+-5% 50V
C 233	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 234	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 236	0893239	CERAMIC CHIP 0.01UF+80-20% 50V

SYMBOL-NO	P-NO	DESCRIPTION
C 238	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 247	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 248	0893072	CERAMIC CHIP 0.47UF+80-20% 25V
C 249	0893162	CERAMIC CHIP 100PF+-5% 50V
C 251	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 260	0893208	CERAMIC CHIP 1000PF+-10% 50V
C 268	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 269	0893246	CERAMIC CHIP 0.047UF+80-20% 50V
C 271	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 272	0893172	CERAMIC CHIP 560PF+-5% 50V
C 275	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 278	0202166	CERAMIC CHIP 820PF+-5% 50V
C 279	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 282	0893165	CERAMIC CHIP 180PF+-5% 50V
C 283	0893166	CERAMIC CHIP 220PF+-5% 50V
C 284	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 287	0893162	CERAMIC CHIP 100PF+-5% 50V
C 289	0893162	CERAMIC CHIP 100PF+-5% 50V
C 291	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 292	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 293	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 294	0893157	CERAMIC CHIP 47PF+-5% 50V
C 295	0893167	CERAMIC CHIP 270PF+-5% 50V
C 296	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 300	0893157	CERAMIC CHIP 47PF+-5% 50V
C 301	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 431	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 601	0893008	CERAMIC CHIP 0.1UF+-10% 16V
C 602	0893008	CERAMIC CHIP 0.1UF+-10% 16V
C 603	0893188	CERAMIC CHIP 0.047UF+-10% 16V
C 604	0893008	CERAMIC CHIP 0.1UF+-10% 16V
C 605	0893155	CERAMIC CHIP 33PF+-5% 50V
C 606	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 607	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 608	0893037	CERAMIC CHIP 3300PF+-10% 50V
C 609	0893037	CERAMIC CHIP 3300PF+-10% 50V
C 610	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 611	0893037	CERAMIC CHIP 3300PF+-10% 50V
C 612	0893211	CERAMIC CHIP 1500PF+-10% 50V
C 613	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 614	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 615	0202015	CERAMIC CHIP 390PF+-2% 50V
C 616	0202157	CERAMIC CHIP 680PF+-2% 50V
C 617	0201071	CERAMIC CHIP 56PF+-5% 50V
C 618	0893004	CERAMIC CHIP 0.047UF+-10% 16V
C 619	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C 620	0893004	CERAMIC CHIP 0.047UF+-10% 16V
C 621	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C 622	0202023	CERAMIC CHIP 1000PF+-2% 50V
C 623	0201092	CERAMIC CHIP 22PF+-5% 50V
C 624	0893004	CERAMIC CHIP 0.047UF+-10% 16V
C 626	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 628	0893199	CERAMIC CHIP 220PF+-10% 50V
C 629	0893217	CERAMIC CHIP 4700PF+-10% 50V
C 630	0893208	CERAMIC CHIP 1000PF+-10% 50V
C 631	0893215	CERAMIC CHIP 3300PF+-10% 50V
C 632	0893182	CERAMIC CHIP 0.015UF+-10% 16V
C 633	0893204	CERAMIC CHIP 470PF+-10% 50V
C 634	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C 635	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 638	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C 640	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C 641	0893031	CERAMIC CHIP 1000PF+-10% 50V
C 642	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C 643	0893031	CERAMIC CHIP 1000PF+-10% 50V
C 644	0893055	CERAMIC CHIP 0.1UF+80-20% 16V
C 647	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 648	0893055	CERAMIC CHIP 0.1UF+80-20% 16V
C 651	0893184	CERAMIC CHIP 0.022UF+-10% 16V
C 653	0893055	CERAMIC CHIP 0.1UF+80-20% 16V
C 654	0893213	CERAMIC CHIP 2200PF+-10% 50V
C 656	0893188	CERAMIC CHIP 0.047UF+-10% 16V
C 660	0893119	CERAMIC CHIP 33PF+-5% 50V
C 661	0893119	CERAMIC CHIP 33PF+-5% 50V
C 662	0893011	CERAMIC CHIP 0.15UF+-10% 16V
C 663	0893011	CERAMIC CHIP 0.15UF+-10% 16V
C 664	0893227	CERAMIC CHIP 0.22UF+80-20% 16V
C 665	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C 667	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 668	0893191	CERAMIC CHIP 6800PF+-10% 25V
C 669	0893008	CERAMIC CHIP 0.1UF+-10% 16V
C 670	0893175	CERAMIC CHIP 1000PF+-5% 50V
C 671	0893191	CERAMIC CHIP 6800PF+-10% 25V
C 672	0893008	CERAMIC CHIP 0.1UF+-10% 16V
C 673	0893175	CERAMIC CHIP 1000PF+-5% 50V
C 674	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 675	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 901	0893114	CERAMIC CHIP 12PF+-5% 50V
C 902	0893114	CERAMIC CHIP 12PF+-5% 50V
C 903	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 904	0893117	CERAMIC CHIP 22PF+-5% 50V
C 905	0893117	CERAMIC CHIP 22PF+-5% 50V
C 906	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 907	0893233	CERAMIC CHIP 1000PF+80-20% 50V
C 908	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 917	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 918	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 920	0893162	CERAMIC CHIP 100PF+-5% 50V
C 922	0893162	CERAMIC CHIP 100PF+-5% 50V
C 923	0893153	CERAMIC CHIP 22PF+-5% 50V
C 924	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C 925	0893175	CERAMIC CHIP 1000PF+-5% 50V
C 926	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 927	0893237	CERAMIC CHIP 4700PF+80-20% 50V
C 928	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 929	0893008	CERAMIC CHIP 0.1UF+-10% 16V
C 931	0893008	CERAMIC CHIP 0.1UF+-10% 16V
C 932	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 933	0893233	CERAMIC CHIP 1000PF+80-20% 50V
C 934	0893233	CERAMIC CHIP 1000PF+80-20% 50V
C 935	0893233	CERAMIC CHIP 1000PF+80-20% 50V
C 936	0893233	CERAMIC CHIP 1000PF+80-20% 50V
C 937	0893233	CERAMIC CHIP 1000PF+80-20% 50V
C 939	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 943	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 944	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 945	0893233	CERAMIC CHIP 1000PF+80-20% 50V
C 947	0893217	CERAMIC CHIP 4700PF+-10% 50V
C 948	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 949	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 951	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 953	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 954	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 955	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 956	0893113	CERAMIC CHIP 10PF+-0.5% 50V
C 957	0893115	CERAMIC CHIP 15PF+-5% 50V
C 959	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C 960	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 962	0893155	CERAMIC CHIP 33PF+-5% 50V
C 963	0893225	CERAMIC CHIP 0.1UF+80-20% 16V

SYMBOL-NO	P-NO	DESCRIPTION
C 967	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C 968	0893055	CERAMIC CHIP 0.1UF+80-20% 16V
C 969	0893055	CERAMIC CHIP 0.1UF+80-20% 16V
R 102	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 103	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 104	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R 105	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R 106	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 109	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R 110	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R 112	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 113	0790027	CHIP RESISTOR 180 OHM+-5% 1/16W
R 114	0790029	CHIP RESISTOR 270 OHM+-5% 1/16W
R 115	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R 116	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R 117	0790035	CHIP RESISTOR 680 OHM+-5% 1/16W
R 118	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 121	0790074	CHIP RESISTOR 560KOHM+-5% 1/16W
R 122	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R 123	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R 125	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R 126	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R 127	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R 128	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R 129	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 130	0790073	CHIP RESISTOR 470KOHM+-5% 1/16W
R 131	0790058	CHIP RESISTOR 39KOHM+-5% 1/16W
R 132	0790062	CHIP RESISTOR 68KOHM+-5% 1/16W
R 133	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R 134	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R 135	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 136	0790008	CHIP RESISTOR 6.8 OHM+-5% 1/16W
R 137	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R 142	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 143	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 144	0790025	CHIP RESISTOR 120 OHM+-5% 1/16W
R 145	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R 146	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 147	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R 148	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R 149	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R 150	0790035	CHIP RESISTOR 680 OHM+-5% 1/16W
R 153	0790056	CHIP RESISTOR 27KOHM+-5% 1/16W
R 154	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 155	0790062	CHIP RESISTOR 68KOHM+-5% 1/16W
R 156	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R 159	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R 185	0790076	CHIP RESISTOR 820KOHM+-5% 1/16W
R 186	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R 187	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R 188	0790054	CHIP RESISTOR 18KOHM+-5% 1/16W
R 189	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R 190	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R 191	0790007	CHIP RESISTOR 5.6 OHM+-5% 1/16W
R 192	0790007	CHIP RESISTOR 5.6 OHM+-5% 1/16W
R 193	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R 199	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 200	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R 202	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R 205	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R 206	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R 208	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R 211	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 212	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R 213	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R 215	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 216	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R 223	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 224	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 225	0790045	CHIP RESISTOR 3.9KOHM+-5% 1/16W
R 226	0790045	CHIP RESISTOR 3.9KOHM+-5% 1/16W
R 227	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R 228	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R 229	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 230	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R 232	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 233	0790018	CHIP RESISTOR 39 OHM+-5% 1/16W
R 234	0790018	CHIP RESISTOR 39 OHM+-5% 1/16W
R 235	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R 236	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 237	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 238	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 240	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 241	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R 242	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 243	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 244	0790058	CHIP RESISTOR 39KOHM+-5% 1/16W
R 247	0790063	CHIP RESISTOR 82KOHM+-5% 1/16W
R 248	0790025	CHIP RESISTOR 120 OHM+-5% 1/16W
R 255	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R 257	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 258	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 259	0104721	CHIP RESISTOR 100KOHM+-0.5% 1/16W
R 260	0790032	CHIP RESISTOR 390 OHM+-5% 1/16W
R 261	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 262	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R 263	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 265	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R 266	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 267	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R 268	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 269	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R 270	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R 271	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R 272	0790067	CHIP RESISTOR 180KOHM+-5% 1/16W
R 273	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 274	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 276	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 278	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R 279	0790035	CHIP RESISTOR 680 OHM+-5% 1/16W
R 280	0790027	CHIP RESISTOR 180 OHM+-5% 1/16W
R 281	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R 283	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 284	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 285	0790061	CHIP RESISTOR 56KOHM+-5% 1/16W
R 287	0790062	CHIP RESISTOR 68KOHM+-5% 1/16W
R 288	0790032	CHIP RESISTOR 390 OHM+-5% 1/16W
R 289	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 290	0790054	CHIP RESISTOR 18KOHM+-5% 1/16W
R 291	0790054	CHIP RESISTOR 18KOHM+-5% 1/16W
R 292	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 293	0790031	CHIP RESISTOR 330 OHM+-5% 1/16W
R 294	0790031	CHIP RESISTOR 330 OHM+-5% 1/16W
R 295	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R 296	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R 297	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R 298	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 302	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R 304	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R 305	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W

SYMBOL-NO	P-NO	DESCRIPTION
R 308	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R 309	0790045	CHIP RESISTOR 3.9KOHM+-5% 1/16W
R 310	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 312	0790045	CHIP RESISTOR 3.9KOHM+-5% 1/16W
R 313	0104721	CHIP RESISTOR 100KOHM+-0.5% 1/16W
R 314	0790045	CHIP RESISTOR 3.9KOHM+-5% 1/16W
R 315	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R 321	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 322	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 323	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R 330	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R 332	0104501	CHIP RESISTOR 750 OHM+-1% 1/16W
R 333	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R 335	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 338	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R 339	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R 340	0790045	CHIP RESISTOR 3.9KOHM+-5% 1/16W
R 341	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R 346	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 347	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 351	0790049	CHIP RESISTOR 8.2KOHM+-5% 1/16W
R 352	0104529	CHIP RESISTOR 11KOHM+-1% 1/16W
R 356	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 363	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 365	0790035	CHIP RESISTOR 680 OHM+-5% 1/16W
R 366	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R 368	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R 372	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 373	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R 374	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R 377	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 378	0790027	CHIP RESISTOR 180 OHM+-5% 1/16W
R 414	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R 415	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 416	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 417	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R 601	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R 602	0790002	CHIP RESISTOR 2.2 OHM+-5% 1/16W
R 603	0790002	CHIP RESISTOR 2.2 OHM+-5% 1/16W
R 604	0790002	CHIP RESISTOR 2.2 OHM+-5% 1/16W
R 605	0790054	CHIP RESISTOR 18KOHM+-5% 1/16W
R 606	0790067	CHIP RESISTOR 180KOHM+-5% 1/16W
R 607	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R 608	0790045	CHIP RESISTOR 3.9KOHM+-5% 1/16W
R 609	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 610	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R 611	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 612	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 613	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 614	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R 615	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 616	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R 617	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R 618	0790066	CHIP RESISTOR 150KOHM+-5% 1/16W
R 619	0790049	CHIP RESISTOR 8.2KOHM+-5% 1/16W
R 620	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 621	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R 622	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 623	0104277	CHIP RESISTOR 5.1KOHM+-1% 1/10W
R 624	0104277	CHIP RESISTOR 5.1KOHM+-1% 1/10W
R 625	0104113	CHIP RESISTOR 2.2KOHM 1/10W
R 626	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 627	0790075	CHIP RESISTOR 680KOHM+-5% 1/16W
R 628	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 629	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R 630	0790058	CHIP RESISTOR 39KOHM+-5% 1/16W
R 631	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R 632	0790029	CHIP RESISTOR 270 OHM+-5% 1/16W
R 633	0790027	CHIP RESISTOR 180 OHM+-5% 1/16W
R 634	0790025	CHIP RESISTOR 120 OHM+-5% 1/16W
R 635	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R 636	0790065	CHIP RESISTOR 120KOHM+-5% 1/16W
R 637	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R 638	0790056	CHIP RESISTOR 27KOHM+-5% 1/16W
R 639	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 640	0790056	CHIP RESISTOR 27KOHM+-5% 1/16W
R 642	0790071	CHIP RESISTOR 330KOHM+-5% 1/16W
R 646	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 648	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 650	0790056	CHIP RESISTOR 27KOHM+-5% 1/16W
R 651	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R 652	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R 653	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 654	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R 655	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 656	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 657	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 658	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R 659	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 660	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 662	0790041	CHIP RESISTOR 1.8KOHM+-5% 1/16W
R 663	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 664	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R 665	0790063	CHIP RESISTOR 82KOHM+-5% 1/16W
R 666	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 667	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 668	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R 670	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R 671	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 672	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R 673	0104276	CHIP RESISTOR 5.6KOHM+-1% 1/10W
R 675	0104114	CHIP RESISTOR 3.3KOHM 0.1W
R 676	0104077	CHIP RESISTOR 1.5MOHM+-5% 1/16W
R 677	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 678	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 679	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 681	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 682	0790035	CHIP RESISTOR 680 OHM+-5% 1/16W
R 683	0790078	CHIP RESISTOR 1 OHM+-5% 1/16W
R 684	0790078	CHIP RESISTOR 1 OHM+-5% 1/16W
R 685	0790078	CHIP RESISTOR 1 OHM+-5% 1/16W
R 686	0790078	CHIP RESISTOR 1 OHM+-5% 1/16W
R 690	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 691	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 692	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 693	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R 700	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 701	0790062	CHIP RESISTOR 68KOHM+-5% 1/16W
R 702	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 703	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 704	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 705	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 706	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R 707	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 708	0790031	CHIP RESISTOR 330 OHM+-5% 1/16W
R 709	0790031	CHIP RESISTOR 330 OHM+-5% 1/16W
R 710	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 711	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R 712	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 713	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W

SYMBOL-NO	P-NO	DESCRIPTION
R 714	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 715	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 718	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 719	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 720	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 721	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 722	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 723	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 725	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 727	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 728	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 729	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 730	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 731	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 732	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 733	0790029	CHIP RESISTOR 270 OHM+-5% 1/16W
R 734	0790029	CHIP RESISTOR 270 OHM+-5% 1/16W
R 735	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 736	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 737	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 738	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 739	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 740	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 741	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R 743	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 744	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 745	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 746	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 747	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 748	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 749	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 750	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 751	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 755	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 756	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 757	0790061	CHIP RESISTOR 56KOHM+-5% 1/16W
R 758	0104111	METAL FILM 10KOHM+-10% 1/10W
R 759	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 760	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 761	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 762	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 763	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 764	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 767	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 768	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 771	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R 772	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 773	0790073	CHIP RESISTOR 470KOHM+-5% 1/16W
R 774	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R 775	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 778	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 783	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 798	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 799	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 801	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R 802	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R 803	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R 804	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R 805	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R 806	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R 807	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 808	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R 811	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 812	01038803	CHIP RESISTOR 1.5MOHM+-10% 0.1W
R 813	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R 814	0790041	CHIP RESISTOR 1.8KOHM+-5% 1/16W
R 815	0790049	CHIP RESISTOR 8.2KOHM+-5% 1/16W
R 816	0790041	CHIP RESISTOR 1.8KOHM+-5% 1/16W
R 899	01038353	CHIP RESISTOR 220 OHM+-5% 0.1W
R 901	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 902	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 903	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 904	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 905	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 906	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 907	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 908	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 909	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 910	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 912	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R 913	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 914	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 915	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 916	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 917	0104093	CHIP RESSISTOR 75 OHM+-5% 1/16W
R 922	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 923	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 924	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 925	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 926	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 927	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 928	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 929	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 930	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 931	0790031	CHIP RESISTOR 330 OHM+-5% 1/16W
R 932	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 933	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 936	0790073	CHIP RESISTOR 470KOHM+-5% 1/16W
R 937	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 938	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 939	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 949	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 950	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 951	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 952	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 953	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 955	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R 956	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 957	0790063	CHIP RESISTOR 82KOHM+-5% 1/16W
R 958	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 959	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R 960	0790061	CHIP RESISTOR 56KOHM+-5% 1/16W
R 961	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R 962	0790066	CHIP RESISTOR 150KOHM+-5% 1/16W
R 963	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 964	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 965	0790073	CHIP RESISTOR 470KOHM+-5% 1/16W
R 966	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 967	0790073	CHIP RESISTOR 470KOHM+-5% 1/16W
R 968	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 969	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 970	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R 971	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R 972	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 973	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R 974	0104121	METAL FILM 27KOHM+-1% 1/10W
R 975	0104116	CHIP RESISTOR 39KOHM 1/10W
R 976	0790062	CHIP RESISTOR 68KOHM+-5% 1/16W
R 977	0790062	CHIP RESISTOR 68KOHM+-5% 1/16W
R 978	0790063	CHIP RESISTOR 82KOHM+-5% 1/16W

SYMBOL-NO	P-NO	DESCRIPTION
R 979	0790063	CHIP RESISTOR 82KOHM+-5% 1/16W
R 980	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R 981	0104121	METAL FILM 27KOHM+-1% 1/10W
R 982	0104112	CHIP RESISTOR 47KOHM+-1% 0.1W
R 983	0104116	CHIP RESISTOR 39KOHM 1/10W
R 984	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 985	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R 986	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R 987	0104112	CHIP RESISTOR 47KOHM+-1% 0.1W
R 988	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R 989	0790022	CHIP RESISTOR 68 OHM+-5% 1/16W
R 991	0790058	CHIP RESISTOR 39KOHM+-5% 1/16W
R 992	0790058	CHIP RESISTOR 39KOHM+-5% 1/16W
R 993	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R 994	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 995	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R 996	0790035	CHIP RESISTOR 680 OHM+-5% 1/16W
R 997	0790035	CHIP RESISTOR 680 OHM+-5% 1/16W
R 998	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R 999	0790068	CHIP RESISTOR 220KOHM+-5% 1/16W
RT 101	0104173	CHIP RESISTOR 15KOHM+-10% 1/8W
RT 102	0104145	CHIP RESISTOR 120 OHM+-10% 1/8W
RT 103	5040125	SEMI VARIABLE 4.7KOHM
RT 104	5040127	SEMI VARIABLE 22KOHM
RT 105	5040123	SEMI VARIABLE 1KOHM
RT 106	5040124	SEMI VARIABLE 2.2KOHM
RT 108	0104153	CHIP RESISTOR 470 OHM+-10% 1/8W
RT 109	5040122	SEMI VARIABLE 470 OHM
RT 110	5040127	SEMI VARIABLE 22KOHM
RT 112	5040128	SEMI VARIABLE 47KOHM
RT 113	5040128	SEMI VARIABLE 47KOHM
RT 114	5040106	SEMI VARIABLE 4.7KOHM
RT 115	5040105	SEMI VARIABLE 2.2KOHM
D 091	5382221	LED PLT-462T3
D 101	5339181	DIODE HSM88S
D 103	5337421	DIODE DAN222
D 107	5337352	DIODE MA132WA
D 108	5337421	DIODE DAN222
D 110	5337421	DIODE DAN222
D 601	5337352	DIODE MA132WA
D 901	5337421	DIODE DAN222
D 902	5337421	DIODE DAN222
D 903	5337421	DIODE DAN222
D 904	5337422	DIODE DA221
D 905	5337422	DIODE DA221
D 906	5337421	DIODE DAN222
D 907	5337421	DIODE DAN222
D 908	5337352	DIODE MA132WA
D 909	5337352	DIODE MA132WA
D 910	5337421	DIODE DAN222
IC 101	1351973	IC CXA1207AR
IC 102	1352001	IC CXA1208R
IC 104	1352311	IC HA118041
IC 105	1351943	IC CXL5502M
IC 108	1352032	IC NJM2249M
IC 109	1350063	IC NJM2233AM
IC 601	1361812	IC CXA1204Q
IC 602	5300193	IC LM2902M
IC 603	5307121	IC CXA8006M
IC 604	5307091	IC LB1857
IC 606	5300193	IC LM2902M
IC 901	1355871	IC CXP80116-595Q
IC 902	1355347	IC HD404439A26H
IC 903	5382382	DIODE GP2S07B
IC 904	5382382	DIODE GP2S07B
IC 905	1354511	IC XRM93C46AF-EA
IC 906	1352023	IC UPD6451AGT-803
IC 907	1352191	IC XRA10393F
IC 908	1352191	IC XRA10393F
IC 909	1352771	IC TA8409F
IC 910	5305832	IC SC7S08F
IC 911	1352731	IC S8420DF
Q 091	1322341	TRANSISTOR PT4810F
Q 092	5382142	DIODE NJL5161K
Q 093	5382142	DIODE NJL5161K
Q 094	1322341	TRANSISTOR PT4810F
Q 101	1323294	TRANSISTOR 2SA1774RS
Q 102	1323293	TRANSISTOR 2SC4617 (R/S)
Q 103	1323294	TRANSISTOR 2SA1774RS
Q 105	1323271	TRANSISTOR DTC144EE
Q 106	1323293	TRANSISTOR 2SC4617 (R/S)
Q 107	1323271	TRANSISTOR DTC144EE
Q 108	1323294	TRANSISTOR 2SA1774RS
Q 111	1323293	TRANSISTOR 2SC4617 (R/S)
Q 112	1323293	TRANSISTOR 2SC4617 (R/S)
Q 113	1323293	TRANSISTOR 2SC4617 (R/S)
Q 114	1323294	TRANSISTOR 2SA1774RS
Q 116	1323294	TRANSISTOR 2SA1774RS
Q 117	1323293	TRANSISTOR 2SC4617 (R/S)
Q 118	1323294	TRANSISTOR 2SA1774RS
Q 119	1323293	TRANSISTOR 2SC4617 (R/S)
Q 121	1323271	TRANSISTOR DTC144EE
Q 122	1323253	TRANSISTOR XP4401
Q 124	1323293	TRANSISTOR 2SC4617 (R/S)
Q 126	1323293	TRANSISTOR 2SC4617 (R/S)
Q 127	1323272	TRANSISTOR DTA144EE
Q 128	1323271	TRANSISTOR DTC144EE
Q 129	1323294	TRANSISTOR 2SA1774RS
Q 130	1323294	TRANSISTOR 2SA1774RS
Q 131	1323294	TRANSISTOR 2SA1774RS
Q 143	1323541	TRANSISTOR FMC5
Q 144	1323272	TRANSISTOR DTA144EE
Q 146	1323293	TRANSISTOR 2SC4617 (R/S)
Q 150	1323271	TRANSISTOR DTC144EE
Q 151	1323301	TRANSISTOR 2SB1218
Q 152	1323271	TRANSISTOR DTC144EE
Q 153	1323272	TRANSISTOR DTA144EE
Q 163	1323541	TRANSISTOR FMC5
Q 165	1323541	TRANSISTOR FMC5
Q 167	1323271	TRANSISTOR DTC144EE
Q 168	1323271	TRANSISTOR DTC144EE
Q 169	1323294	TRANSISTOR 2SA1774RS
Q 170	1323294	TRANSISTOR 2SA1774RS
Q 173	1323293	TRANSISTOR 2SC4617 (R/S)
Q 174	1323294	TRANSISTOR 2SA1774RS
Q 175	1323271	TRANSISTOR DTC144EE
Q 176	1323271	TRANSISTOR DTC144EE
Q 180	1323294	TRANSISTOR 2SA1774RS
Q 181	1323293	TRANSISTOR 2SC4617 (R/S)
Q 400	1323293	TRANSISTOR 2SC4617 (R/S)
Q 601	1323231	TRANSISTOR 2SB1462
Q 602	1323293	TRANSISTOR 2SC4617 (R/S)
Q 603	1323231	TRANSISTOR 2SB1462
Q 604	1323293	TRANSISTOR 2SC4617 (R/S)
Q 606	5326101	TRANSISTOR FMW1
Q 607	1323293	TRANSISTOR 2SC4617 (R/S)
Q 608	1323293	TRANSISTOR 2SC4617 (R/S)
Q 609	1323231	TRANSISTOR 2SB1462
Q 610	1323293	TRANSISTOR 2SC4617 (R/S)
Q 611	1323271	TRANSISTOR DTC144EE

SYMBOL-NO	P-NO	DESCRIPTION
Q 901	1323271	TRANSISTOR DTC144EE
Q 902	1323272	TRANSISTOR DTA144EE
Q 903	1323271	TRANSISTOR DTC144EE
Q 904	1323271	TRANSISTOR DTC144EE
Q 905	1323271	TRANSISTOR DTC144EE
Q 908	1323293	TRANSISTOR 2SC4617 (R/S)
Q 909	1323271	TRANSISTOR DTC144EE
Q 911	1323293	TRANSISTOR 2SC4617 (R/S)
Q 912	1323232	TRANSISTOR 2SB1462
Q 913	1323272	TRANSISTOR DTA144EE
Q 914	1323271	TRANSISTOR DTC144EE
Q 915	1323081	TRANSISTOR 2SA1036K
Q 916	1323271	TRANSISTOR DTC144EE
Q 918	1323232	TRANSISTOR 2SB1462
ZD 903	5339213	DIODE RD2.7MB2
L 101	0773132	CHOKE COIL 100UH+-5%
L 102	0773135	CHOKE COIL 180UH+-5%
L 103	0773094	CHOKE COIL 100UH+-10%
L 104	0773118	CHOKE COIL 10UH+-5%
L 105	0773126	CHOKE COIL 39UH+-5%
L 106	0773125	CHOKE COIL 33UH+-5%
L 107	0773092	CHOKE COIL 47UH+-10%
L 108	0773118	CHOKE COIL 10UH+-5%
L 109	0773127	CHOKE COIL 47UH+-5%
L 110	0773132	CHOKE COIL 100UH+-5%
L 111	0773133	CHOKE COIL 120UH+-5%
L 112	0773136	CHOKE COIL 220UH+-5%
L 113	0773111	CHOKE COIL 2.7 UH
L 114	0773097	CHOKE COIL 330UH+-10%
L 115	0773126	CHOKE COIL 39UH+-5%
L 116	0773122	COIL,CHOKE 18UH
L 117	0773126	CHOKE COIL 39UH+-5%
L 118	0773124	CHOKE COIL 27UH+-5%
L 120	0773116	CHOKE COIL 6.8UH+-10%
L 121	0773111	CHOKE COIL 2.7 UH
L 122	0773135	CHOKE COIL 180UH+-5%
L 123	0773136	CHOKE COIL 220UH+-5%
L 124	5159177	COIL 470UH
L 125	0773134	CHOKE COIL 150UH+-5%
L 127	0773123	CHOKE COIL 22UH+-5%
L 128	0773132	CHOKE COIL 100UH+-5%
L 129	0773133	CHOKE COIL 120UH+-5%
L 131	0773092	CHOKE COIL 47UH+-10%
L 137	0773094	CHOKE COIL 100UH+-10%
L 138	0773134	CHOKE COIL 150UH+-5%
L 139	0773123	CHOKE COIL 22UH+-5%
L 141	0773092	CHOKE COIL 47UH+-10%
L 143	0773094	CHOKE COIL 100UH+-10%
L 145	0773094	CHOKE COIL 100UH+-10%
L 601	0773097	CHOKE COIL 330UH+-10%
L 602	0773097	CHOKE COIL 330UH+-10%
L 603	0773097	CHOKE COIL 330UH+-10%
L 604	0773094	CHOKE COIL 100UH+-10%
L 605	0773092	CHOKE COIL 47UH+-10%
L 901	0773087	CHOKE COIL 10UH+-10%
L 903	0773087	CHOKE COIL 10UH+-10%
L 904	0773094	CHOKE COIL 100UH+-10%
L 905	0773092	CHOKE COIL 47UH+-10%
L 906	0773087	CHOKE COIL 10UH+-10%
L 907	0773126	CHOKE COIL 39UH+-5%
L 908	0773087	CHOKE COIL 10UH+-10%
L 909	0773081	COIL,CHOKE 1UH
X 101	5778421	CRYSTAL
X 601	5778361	CRYSTAL
X 901	5778351	CRYSTAL

SYMBOL-NO	P-NO	DESCRIPTION
X 902	5778261	CRYSTAL
X 903	5778231	CRYSTAL
CN 903	4134981	CONNECTOR,FLEXIBLE
CP 102	5172651	FILTER,BAND PASS
CP 103	5172512	FILTER,BAND PASS
CP 105	5172521	FILTER,LOW PASS
CP 107	5172681	FILTER,LOW PASS
CP 108	5172264	FILTER,BAND PASS
F 551	5723212	FUSE 1.6A
F 552	5723212	FUSE 1.6A
F 553	5723212	FUSE 1.6A
JK 001	5695291	SOCKT
S 091	5635461	SWITCH
S 092	5635451	SWITCH
S 551	5621731	SWITCH
S 552	5634862	SWITCH
S 901	5621951	SWITCH
S 902	5635601	SWITCH
S 903	5635541	SWITCH
S 904	5635541	SWITCH
S 905	5635541	SWITCH
S 906	5635541	SWITCH
S 907	5635541	SWITCH
S 908	5635541	SWITCH

CAMERA SECTION

C1051	0202146	CERAMIC CHIP 1.0UF+80-20% 16V
C1053	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1054	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1055	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1056	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1057	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1059	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1060	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1061	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1062	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1063	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1065	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1066	0893117	CERAMIC CHIP 22PF+-5% 50V
C1067	0893129	CERAMIC CHIP 180PF+-5% 50V
C1302	0893227	CERAMIC CHIP 0.22UF+80-20% 16V
C1304	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1305	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1306	0893121	CERAMIC CHIP 39PF+-5% 50V
C1307	0893175	CERAMIC CHIP 1000PF+5% 16V
C1308	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1310	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1311	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1313	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C1315	0893175	CERAMIC CHIP 1000PF+5% 16V
C1316	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1317	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1318	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1319	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1320	0202146	CERAMIC CHIP 1.0UF+80-20% 16V
C1321	0893223	CERAMIC CHIP 0.047UF+80-20% 16V
C1322	0893126	CERAMIC CHIP 100PF+-5% 50V
C1323	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1324	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1325	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1326	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1328	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1329	0893153	CERAMIC CHIP 22PF+-5% 50V
C1330	0893153	CERAMIC CHIP 22PF+-5% 50V

SYMBOL-NO	P-NO	DESCRIPTION
C1331	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1336	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1340	0893151	CERAMIC CHIP 15PF+-5% 50V
C1341	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1342	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1343	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1344	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1345	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1346	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1347	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1348	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1349	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1357	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1359	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1364	0893151	CERAMIC CHIP 15PF+-5% 50V
C1365	0893242	CERAMIC CHIP 0.022UF+80-20% 50V
C1366	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1367	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1369	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1370	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1371	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1372	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1373	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1374	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1375	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1376	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1377	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1380	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1381	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1382	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1383	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1384	0893223	CERAMIC CHIP 0.047UF+80-20% 16V
C1387	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1392	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1393	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1395	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1396	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
CT1203	5058573	TRIMMER
CT1204	5058576	CAPACTOR TRIMMER
R1001	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1002	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1003	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R1004	0790062	CHIP RESISTOR 68KOHM+-5% 1/16W
R1007	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R1008	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R1009	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R1011	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1012	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1013	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R1014	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R1016	0790072	CHIP RESISTOR 390KOHM+-5% 1/16W
R1017	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1018	0790068	CHIP RESISTOR 220KOHM+-5% 1/16W
R1019	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R1020	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1021	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R1022	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R1023	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R1024	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1028	0790054	CHIP RESISTOR 18KOHM+-5% 1/16W
R1029	0790035	CHIP RESISTOR 680 OHM+-5% 1/16W
R1030	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R1031	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1032	0790056	CHIP RESISTOR 27KOHM+-5% 1/16W
R1033	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W

SYMBOL-NO	P-NO	DESCRIPTION
R1034	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1035	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1036	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R1201	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R1202	0790045	CHIP RESISTOR 3.9KOHM+-5% 1/16W
R1203	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R1207	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R1208	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1209	0790019	CHIP RESISTOR 47 OHM+-5% 1/16W
R1210	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R1213	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1214	0790067	CHIP RESISTOR 180KOHM+-5% 1/16W
R1215	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R1216	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1217	0790026	CHIP RESISTOR 150 OHM+-5% 1/16W
R1223	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R1224	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R1228	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1229	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1231	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1233	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1234	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1236	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1237	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1248	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R1251	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R1253	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1254	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R1259	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1260	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1261	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1262	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1263	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1266	0104594	CHIP RESISTOR 2.2KOHM+-5% 1/32W
R1267	0104594	CHIP RESISTOR 2.2KOHM+-5% 1/32W
R1268	0104594	CHIP RESISTOR 2.2KOHM+-5% 1/32W
R1269	0104594	CHIP RESISTOR 2.2KOHM+-5% 1/32W
R1270	0104594	CHIP RESISTOR 2.2KOHM+-5% 1/32W
R1271	0104594	CHIP RESISTOR 2.2KOHM+-5% 1/32W
R1273	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1277	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R1295	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1296	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1297	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1298	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R1300	0104594	CHIP RESISTOR 2.2KOHM+-5% 1/32W
R1301	0104594	CHIP RESISTOR 2.2KOHM+-5% 1/32W
R1302	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1303	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1304	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1305	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R1306	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R1307	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1308	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1309	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1311	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1313	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1321	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1324	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1325	0104594	CHIP RESISTOR 2.2KOHM+-5% 1/32W
R1326	0104594	CHIP RESISTOR 2.2KOHM+-5% 1/32W
R1327	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1328	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1331	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1332	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W

SYMBOL-NO	P-NO	DESCRIPTION
R1333	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1334	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R1335	0790058	CHIP RESISTOR 39KOHM+-5% 1/16W
R1336	0790058	CHIP RESISTOR 39KOHM+-5% 1/16W
R1338	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1339	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1340	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1342	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1343	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1344	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1345	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1346	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1350	0104581	CHIP RESISTOR 1KOHM+-5% 1/32W
R1355	0790023	CHIP RESISTOR 82 OHM+-5% 1/16W
R1356	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1357	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1358	0104502	CHIP RESISTOR 820 OHM+-1% 1/16W
R1359	0104554	CHIP RESISTOR 1KOHM+-1% 1/16W
R1360	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R1361	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R1362	0104565	CHIP RESISTOR 22KOHM+-1% 1/16W
R1364	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1365	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1367	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R1368	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1369	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1385	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R1386	0104539	CHIP RESISTOR 6.2KOHM+-1% 1/16W
R1387	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1388	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1394	0790029	CHIP RESISTOR 270 OHM+-5% 1/16W
R1395	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1398	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1409	0790062	CHIP RESISTOR 68KOHM+-5% 1/16W
R1411	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1414	0104592	CHIP RESISTOR 220 OHM+-5% 1/32W
R1415	0790011	CHIP RESISTOR 10 OHM+-5% 1/16W
R1416	0790011	CHIP RESISTOR 10 OHM+-5% 1/16W
RT1001	5040109	SEMI VARIABLE 47KOHM
D1001	5337353	DIODE MA132K
D1002	5337353	DIODE MA132K
D1003	5337353	DIODE MA132K
D1201	5337354	DIODE MA133
D1203	5337451	DIODE RB715F
D1204	5337471	DIODE KV1470
D1206	5337354	DIODE MA133
IC1002	5300163	IC RC3404AM
IC1003	5355513	IC LM2904M
IC1201	1351533	IC CXD1250N
IC1202	1352711	IC HA118144
IC1203	1354471	IC TG41A
IC1204	1354721	IC HD49306
IC1207	1352091	IC MM1036
IC1208	1354692	IC HG51A007
IC1209	1350471	IC S-8054ALR
IC1210	1355861	IC HD6433308
IC1211	1354511	IC XRM93C46AF-EA
IC1212	1352671	IC HD49307
IC1213	1354701	IC HG51A002
IC1214	5304371	IC S-81250HG
Q1001	1323321	TRANSISTOR 2SD2216
Q1002	1323321	TRANSISTOR 2SD2216
Q1003	1323321	TRANSISTOR 2SD2216
Q1004	1323321	TRANSISTOR 2SD2216
Q1005	1323331	TRANSISTOR 2SA1806

SYMBOL-NO	P-NO	DESCRIPTION
Q1006	1323341	TRANSISTOR 2SC4691
Q1007	1323341	TRANSISTOR 2SC4691
Q1008	1323331	TRANSISTOR 2SA1806
Q1201	1323291	TRANSISTOR 2SC4617
Q1202	1323321	TRANSISTOR 2SD2216
Q1203	5326201	TRANSISTOR FMG2
Q1204	1323321	TRANSISTOR 2SD2216
Q1205	1323321	TRANSISTOR 2SD2216
Q1206	1323321	TRANSISTOR 2SD2216
Q1207	1323171	TRANSISTOR UN9213
Q1208	1323171	TRANSISTOR UN9213
Q1210	5326421	TRANSISTOR 2SC4081BR
Q1212	1323172	TRANSISTOR UN9113
L1001	0773094	CHOKE COIL 100UH+-10%
L1202	0773005	COIL 220UH
L1203	0773094	CHOKE COIL 100UH+-10%
L1204	0773094	CHOKE COIL 100UH+-10%
L1206	0773094	CHOKE COIL 100UH+-10%
L1207	0773092	CHOKE COIL 47UH+-10%
L1208	0773094	CHOKE COIL 100UH+-10%
L1210	0773094	CHOKE COIL 100UH+-10%
L1211	0773087	CHOKE COIL 10UH+-10%
L1212	0773087	CHOKE COIL 10UH+-10%
L1213	0773094	CHOKE COIL 100UH+-10%
L1214	0773087	CHOKE COIL 10UH+-10%
X1201	5778443	CRYSTAL
X1203	5778431	CRYSTAL
X1204	5778841	CRYSTAL
BL1001	5172541	FILTER
BL1201	5172544	CORE
BL1202	5172544	CORE
BL1203	5172544	CORE
DL1201	5172644	FILTER, BAND PASS
DL1202	5172573	FILTER, LOW PASS

ELECTRONIC VIEWFINDER SECTION

C 803	0209995	CERAMIC CHIP 1.0UF+80-20% 16V
C 805	0256871	ELECTROLYTIC 47UF 25V
C 808	0256153	ELECTROLYTIC 3.3MF 50V
C 809	0201997	CERAMIC DISC 0.1UF+80-20% 50V
C 811	0209852	CERAMIC CHIP 180PF+-5% 50V
C 812	0201997	CERAMIC DISC 0.1UF+80-20% 50V
C 814	0209969	CERAMIC CHIP 0.1UF+80-20% 25V
C 816	0202151	CERAMIC CHIP 2200PF+-5% 50V
C 817	0209838	CERAMIC CHIP 0.01UF+-20% 50V
C 818	0893062	CERAMIC CHIP 1UF+80-20% 16V
C 819	0893062	CERAMIC CHIP 1UF+80-20% 16V
R 801	01038523	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 802	01038743	CHIP RESISTOR 390KOHM+-5% 0.1W
R 803	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 804	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 805	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 806	01038193	CHIP RESISTOR 10 OHM+-5% 0.1W
R 807	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 808	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 809	01038473	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 811	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 812	01038573	CHIP RESISTOR 15KOHM+-5% 0.1W
R 813	01038453	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 814	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 815	01038623	CHIP RESISTOR 39KOHM+-5% 0.1W
R 816	0103814	CHIP RESISTOR 3.9 OHM+-10% 0.1W
R 817	01038463	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 818	01038633	CHIP RESISTOR 47KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R 819	01038483	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R 820	01038673	CHIP RESISTOR 100KOHM+-5% 0.1W
R 821	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 822	01038313	CHIP RESISTOR 100 OHM+-5% 0.1W
R 824	01038793	CHIP RESISTOR 1MOHM+-5% 0.1W
R 826	01038763	CHIP RESISTOR 560KOHM+-5% 0.1W
R 827	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 828	01038433	CHIP RESISTOR 1KOHM+-5% 0.1W
RT 802	5040082	SEMI VARIABLE 500 OHM
RT 803	5035204	SEMI VARIABLE 2.2MOHM
RT 805	5035204	SEMI VARIABLE 2.2MOHM
D 801	5328321	DIODE MA151K (MH)
D 802	5337321	DIODE MA199
IC 801	1351631	IC HA118121FP
Q 801	5323831	TRANSISTOR 2SD974
Q 802	5326682	TRANSISTOR XN1B301
L 801	0773003	COIL 47UH
L 802	5244016	COIL
TF 801	5721352	FUSE

SYMBOL-NO	P-NO	DESCRIPTION

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VM-E23A(U,C),(PX) TK No.3552E TOKAI

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HITACHI

SERVICE MANUAL

TK | No. 3554E

VM-E23A

Technical Information

MANUAL RELATED TO THE VM-E23A

MODEL/TITLE	Manual No.
VM-E23A Technical Data	3552E
VM-E25A Technical Information	3557E

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

8mm VIDEO CAMERA/RECORDER

Nov. 1991 TOKAI WORKS

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GENERAL

The circuit configuration and operation are basically the same as those in the VM-E25A. The major difference is that the VM-E23A is not provided with the title signal generator.

CAMERA

1. GENERAL (Figs. 2-1 and 2-2)

1-1. Circuit Configuration (Fig. 2-1)

This employs a DSP (Digital Signal Processing) circuit for camera signal processing to improve color reproduction and uses a 1-chip IC to save power consumption and save space. By digital signal processing, the automatic iris and automatic white balance are controlled by artificial intelligence.
The camera signal processing circuit consists of 14 ICs with which process the signal as follows.

(1) CCD Color Image Sensor (IC1001: CCD SENSOR)
This is a 1/3" interline type CCD color image sensor and converts incoming light from the subject to a video signal.

(2) Automatic Iris Driver (IC1002: IRIS DRIVE)
This drives the iris motor to control the iris opening.

(3) F-value Detector (IC1003: F.DET)
This supplies bias current to the Hall device and detects the F-value.

(4) Vertical Driver (IC1201: VERT. DRIVE)
This generates four phase-shifted vertical resistor clock pulses and drives IC1001.

(5) CDS/AGC Circuit (IC1202: CDS/AGC)
This processes a continuous signal and attenuates noise generated by the CCD sensor to improve the signal-to-noise ratio. This also controls the gain of the input signal so that the input signal supplied to the analog-to-digital converter is constant. The gain control is performed by the state data supplied from a digital microprocessor (IC1210: D-μP).

(6) Sensor Driver (IC1203: SENSOR DRIVE)
This drives the CCD sensor and controls the shutter speed. This is also controlled by IC1210.

(7) Analog-to-Digital Converter (IC1204: A/D CONV)
This converts the analog signal to 9-bit digital data.

(8) Zoom Motor Driver (IC1207: ZOOM DRIVE)
This drives the zoom motor located on the autofocus/lens block.

(9) Electronic Zoom (IC1208: ELE. ZOOM)
This performs zooming in and out. The zooming ratio is set to 16X to 64X.

(10) Reset Circuit (IC1209)
This initializes IC1210.

(11) Digital Microprocessor (IC1210: D-μP)
IC1210 communicates with the sub system control microprocessor (IC902: S-μP) and controls IC1203, IC1208 and IC1213.

(12) EEPROM (IC1211: EEPROM)
This memorizes state data, adjustment data, etc.

(13) Digital-to-Analog Converter (IC1212: D/A CONV)
This converts 8-bit digital luma and chroma signals to analog luma and chroma signals and supplies them to the luma/chroma circuit.

(14) Digital Signal Processing Circuit (IC1213: DSP)
This memorizes (delays) the input signal by 2H, processes 3H lines, extracts the luma and chorma signals using filters, processes the luma signal (horizontal and vertical enhance, gamma correction, etc.), encodes the signal, matrixes the signal to generate R/G/B three-color primary signals, processes the chroma signal (white balance, gamma correction, color difference signal matrixing, etc.), controls iris opening and controls the white balance. This also generates sync pulses and timing pulses for processing the signal by a sync generator and timing pulse generator.

(15) Automatic Focus Control Circuit (AUTOFOCUS)
This controls the focus lens using reflected infrared rays from the subject.

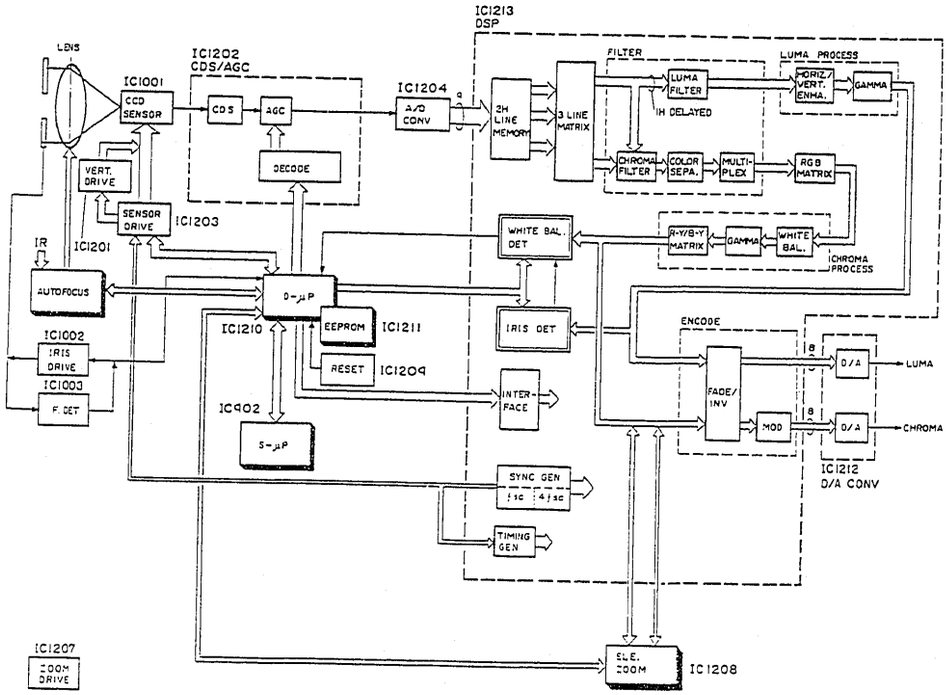

Fig. 2-1 Circuit Configuration of Camera Circuit

1-2. CCD Color Image Sensor (Fig. 2-2)

Table 2 shows the specifications of the CCD color image sensor.

Table 2 Specifications of CCD Sensor

Item	ICX044BK
Chip Size	6.08mm (H) X 5.00mm (V)
Image Size (Optical)	1/3"
Picture Elements (Total)	542 (H) x 494 (V) (267,748)
Picture Elements (Effective)	512 (H) x 492 (V) (251,904)
Color Filter	Ye, Cy, Mg, G (Complementary)
Readout	Field
Variable Shutter Speed	1/60s (Normal), 1/120s to 1/10,000s

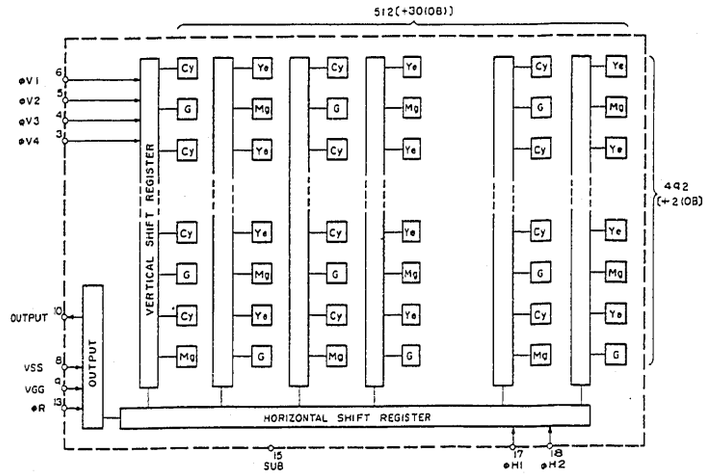

Fig. 2-2 CCD Color Image Sensor

2. PIN FUNCTIONS OF DIGITAL MICROPROCESSOR (IC1210: D-μP)

Pin No.	I/O	Active Level	Abbreviation	Function
1	I	Lo	RESET(Lo)	Intializes IC1210.
2	O	(Pulse)	OSC OUT	Generate 16MHz clock pulse.
3	I	(Pulse)	OSC IN	
4	-	-	-	Not used. Connected to 5V.
5	-	-	-	
6	I	Lo	NWI(Lo)	Not used. Connected to 5V.
7	I	Lo	STANDBY(Lo)	
8	-	-	B+(5V)	Connected to 5V.
9	-	-	CLOCK(A)	Not used.
10	I	(Pulse)	RX DATA	Communicate with personal computer for initial setting and adjustmens.
11	O	(Pulse)	TX DATA	
12	-	-	GND	Grounded.
13	O	Hi/Lo	SHUT.1	Not used.
14	O	Hi/Lo	SHUT.2	
15	O	Hi/Lo	SHUT.3	
16	O	Hi	T-160	Not used.
17	I	Lo	FULL AUTO SW (Lo)	Detects full automatic mode and sets the mode of the iris, white balance and focus to the automatic.
18	i	(Pulse)	AE TIMING	Detects the timing for programmed AE operation.
19	I	(Pulse)	FV	Input pulses for detecting the iris data.
20	I	(Pulse)	AREA2	
21	I	(Pulse)	CHD	
27	I	(Pulse)	AREA1	
28	I	(Pulse)	AREA3	
42	I	(Pulse)	CHD	
22	O	(Pulse)	SHUT.4	Determines the shutter speed.
23	O	(Pulse)	DATA(D-PG/D-EZ)	Transfer data to the sensor driver and electronic zoom circuit.
24	O	(Pulse)	CLOCK(D-EZ)	
25	O	(Pulse)	CLOCK(D-PG)	
26	O	(Pulse)	LOAD(D-PG/D-EZ)	
29	-	-	B+(5V)	Connected to 5V.

Pin No.	I/O	Active Level	Abbreviation	Function
30	I	Lo	ZOOM MOVE SW(Lo)	Detect the electronic zoom switch.
31	O	Hi	MOVE(VERT.)	Not used.
32	O	Hi	MOVE(HORIZ.)	
33	I	0V - 5V	F.DET(A/D)	Detects F-value detected by the Hall device in the iris motor.
34	I	0V - 5V	KEY1(A/D)	Detects the operation switches, TITLE, FOCUS, RESET, DISPLAY, FADE, SHUTTER, DATE and REVIEW.
35	I	0V - 5V	KEY3(A/D)	
37	I	0V - 5V	KEY2(A/D)	
38	-	-	GND(A)	Grounded.
39	I	(Pulse)	DATA(ROM-D)	Communicate with the EEPROM (IC1211).
40	O	(Pulse)	DATA(D-ROM)	
41	O	(Pulse)	CLOCK(D-ROM)	
44	O	(Pulse)	CS(ROM)	
43	O	Hi	KNEE	Not used.
45	O	PWM	IRIS DRIVE	Drives the iris motor.
46	-	-	-	Not used.
47	-	-	B + (5V)	Connected to 5V.
48	I	Lo	COUNT CLEAR (Lo)	Set internal mode.
49	I	Lo	SECAM(Lo)	
50	I	Lo	PAL(Lo)	
51	I	Lo	ZOOM(Lo)	
52	O	Hi	BEFORE	Not used.
53	O	Hi	NEXT	
54	O	Hi	TITLE ON	
55	O	Hi	RESET(Lo)	
56	-	-	GND	Grounded.
57	O	Hi	PROTECT	Not used.
58	O	Hi	CAMERA ON	Turns the regulator on during camera recording.
59 - 61	-	-	-	Not used.
62	O	(Pulse)	DATA(D-DSP)	Communicate with the digital signal processing circuit (IC1213).
63	O	(Pulse)	CLOCK(D-DSP)	
64	O	(Pulse)	LOAD(D-DSP)	
65	I	(Pulse)	DATA(DSP(DET)-D)	
66	O	(Pulse)	CLOCK(D-DSP (DET))	
67	O	(Pulse)	LOAD(D-DSP (DET))	
68	O	(Pulse)	DATA(D-DSP (DET))	
69	O	(Pulse)	CLOCK(D-AGC)	Transfer AGC control data to the CDS/AGC circuit (IC1201).
70	O	(Pulse)	DATA(D-AGC)	
71	I	Lo	TELE SW(Lo)	Detect the manual zoom switches.
72	I	Lo	WIDE SW(Lo)	
73	-	-	GND	Grounded.
74	O	Hi	TELE	Drive the zoom motor.
75	O	Hi	WIDE	
76	O	Hi	AF ON	Turns the automatic focus control circuit.
77	O	Hi	CS(D)	Communicate with the sub system control microprocessor (IC902).
78	O	(Pulse)	DATA(D-S)	
79	I	(Pulse)	DATA(S-D)	
80	I	(Pulse)	CLOCK(S-D)	

1. GENERAL (Fig. 3)

Two microprocessors control the system as follows.

1-1. Roles of Main System Control Microprocessor (IC901: M-μP)

IC901 controls the following when power is supplied from a 6V battery or AC adapter.

(1) Receives data according to the EJECT and POWER switch inputs, short-circuit detection input and presence/absence of battery connected to control power on/off.

(2) Transfers the overdischarge detection reference voltage and switching point to the EAROM (IC905) in the test mode and the slow tracking data and artificial V.SYNC phase data during power off . IC901 reads the data when the power is turned on.

(3) Receives the battery terminal voltage, measures it and converts it to display data. Detects short-circuits to protect circuits.

(4) Transfers commands and function data to the luma signal processing circuit (IC101: LUMA PROCESS).

(5) Monitors the outputs of the sensors in the mechanism to detect the type of cassette, opening or closing of the cassette holder, the operation states of motors and the tape transport.

(6) Detects connection of the A/V IN/OUT connector (JK001).

(7) Receives operation key data supplied to JK001.

(8) Controls the loading motor to switch the operation mode of the mechanism.

(9) When pause is instructed during recording, IC901 detects the amount of tape transported so the amount of overlap is minimum. IC901 also controls the bias oscillation (on/off) of the flying erase head.

(10) Switches the operation mode (recording or playback) of the head switching circuit (IC104: HEAD SWITCH) of the video heads.

(11) Controls the video and audio outputs.

(12) Controls the pilot signal selection during recording and playback.

(13) Receives CAPST.FG signal and ATF error voltage to control the capstan servo.

(14) Receives CYL.FG, PG and V.SYNC signals to control the cylinder servo.

(15) Generates an artificial V.SYNC signal during trick play and applies it to the video output.

(16) Generates a SW30Hz signal from the PG signal and uses this to time the start of recording and erasing.

(17) Communicates operation data and backup data with IC902 via communications lines.

1-2. Roles of Sub System Control Microprocessor (IC902: S-μP)

IC902 controls the following when power is supplied from a 6V battery, AC adapter or 3V lithium battery.

(1) Transfers data on the positions and functions of the operation switches to IC901 through communications lines with IC901, and receives data of the operation mode from IC901. IC902 also communicates with a digital microprocessor (IC1210: D-μP) in the camera block, transfers operation and function data and receives display data.

(2) Controls the shutter speed.

(3) Detects the power or backup mode by a backup detector (IC911: BACKUP DET) and maintains infomations for data, time, tape counter, etc.

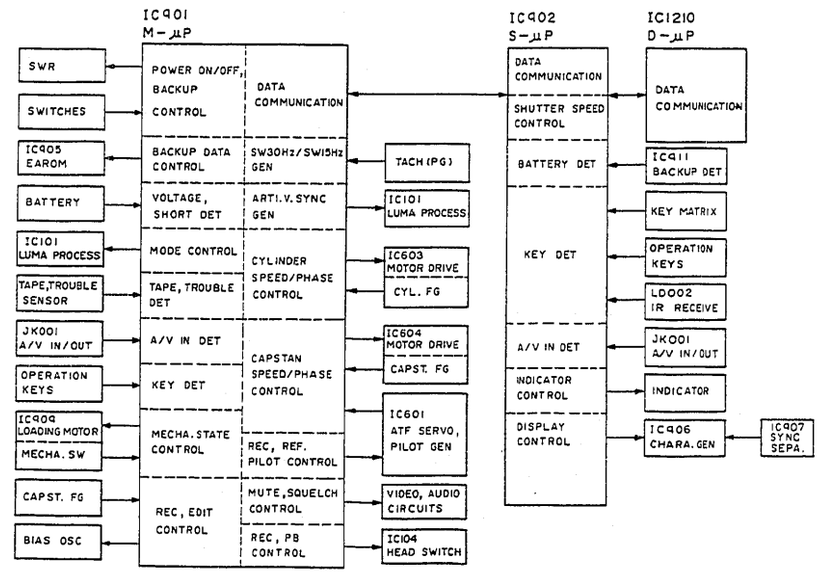

Fig. 3 Circuit Configuration of System Control Circuit

(4) Detects switch inputs from direct operation keys inputs (and infrared ray receiver (LD002: IR RECEIVE)).
(5) Drives the tally indicator.
(6) Transfers character and display position data to a character signal generator (IC906: CHARA. GEN).

2. PIN FUNCTION OF MICROPROCESSORS

2-1. Main System Control Microprocessor (IC901: M-μP)

Pin No.	I/O	Active Level	Abbreviation	Function
1	-	-	-	Not used.
2	O	(Pulse)	SW30Hz	Switches the video heads, switches the luma signal frequency modulation (fH/2 offset) and suppresses audio switching noise.
3	O	Hi	PB	Sets the mode of the video and audio circuits to playback.
4	O	Lo	REVERSE(Lo)	Reverses the capstan motor.
5	O	Hi	MUTE	Mutes audio signal during loading.
6	O	Hi	SQUELCH	Inhibits the video signal output during loading.
7	O	Hi	FE ON	Activates flying erase head during recording and dubbing.
8	O	Hi	PRECONT.	Turns the preamplifiers in the head switching circuit on in the playback.
9 10	O O	Hi Hi	fH CORRECT.2 fH CORRECT.1	Not used.
11	O	Hi/ (Pulse)	CAMERA ON/ REF.210Hz	Selects the input signalof video circuit and also generates the powers required by the camera block. This goes "Lo" when an A/V input adapter is connected to the A/V IN/OUT connector. This also generates the REF.210Hz signal in the test mode.
12	O	Hi/Lo	SYNCHRO.EDIT	Controls the record and record pause modes of the VCR connected to the A/V IN/OUT connector during dubbing.
13	O	Hi	CS(ROM)	Enables the communication lines between IC901 and IC905.
14	O	Lo	CS(Lo(Y/C))	Enables the communication lines between IC901 and IC101.
15	O	Hi/Lo	REQUEST(M-S)	Commands the data transfer and data transfer is completed to IC902.
16	O	Hi	C5V SW	Not used.
17	O	Hi	VCR ON	Controls the switching rgulator to generate powers required by the VCR block.
18	O	(Pulse)	END LED	Drives the end LED for tape end sensors.
19	I	Lo	CAMERA SW(Lo)	Detects the POWER SAVE switch is set to "NORMAL" with the POWER switch has been set to "CAMERA".
20	I	Lo	VCR SW(Lo)	Detects the POWER switch is set to "VCR".
21	I	Lo	EJECT SW(Lo)	Detects the EJECT switch and opens the cassette holder.
22	I	Lo	CASSETTE SW (Lo)	Detects the opening of the cassette holder.
23	I	Hi/Lo	ME/MP(Lo) SW	Detects type of tape (Metal Evaporated or Metal Powdered).
24	I	Lo	AV IN(Lo)	Detects the connection of the A/V IN/OUT connector.
25	I	Lo	REC SW(Lo)	Detects the REC START/STOP switch.
26	I	Hi	TEST	Enters the test mode when adjustment is required.
27	O	Hi/Lo	SP/LP(Lo)	Not used.
28	O	Lo	ATF OFF(Lo)	Not used.
29	O	Hi	CYL.ON	Stops the cylinder motor rotation to save power consumption when it stops.
30	O	Hi	CAPST.ON	Stops the capstan motor rotation to save the power consumption when it stops.
31	-	-	-	Not used. Grounded.
32	I	Lo	RESET(Lo)	Initilizes the IC901.
33	-	-	GND	Grounded.
34 35	O I	(Pulse) (Pulse)	XTAL OUT XTAL IN	Generates 16MHz clock pulse.

Pin No.	I/O	Active Level	Abbreviation	Function
36 37 38 39	I I O I	Lo (Pulse) (Pulse) (Pulse)	CS(M(Lo)) DATA(S-M) DATA(M-S) CLOCK(S-M)	Communicates with IC902.
40	I	Lo	WAKEUP(Lo)	Activates IC901 when the voltage is "Lo".
41	I	(Pulse)	DATA(ROM-M)	Receives the data from IC905.
42 43	O O	(Pulse) (Pulse)	DATA(M-ROM/ -Y/C) CLOCK(M-ROM/ -Y/C)	Communicates with IC905 and IC101.
44	I	0V - 5V	TAPE SW(A/D)	Detects the tape thickness, wether the tab is present/absent and HMP/MP.
45	I	0V - 5V	BATT.(A/D)	Detects the battery remaining voltage and short-circuits.
46	I	0V - 5V	DEW(A/D)	Detects condensation.
47	I	0V - 5V	VCR KEY(A/D)	Detects operation keys by comparing the input voltage with reference voltage.
48	I	0V - 5V	MECHA. STATE (A/D)	Detects the positon of the mechanism.
49	I	(Pulse)	REW END	Detects tape end during rewind and reverse search.
50	I	(Pulse)	FWD END	Detects tape end during fast forward and forward search.
51	I	0V - 5V	ATF ERROR	Controls the capstan phase by inputting the ATF error voltage. This signal is also used to detect the tape speed during playback.
52	-	-	GND	Grounded.
53	-	-	A/D REF.	Inputs reference voltage for analog-to-digital conversion.
54	-	-	B+(5V)	Connected to 5V.
55	I	(Pulse)	T.REEL	Detects reel lock of take-up reel, counts number for displaying tape counter, calculates tape remaining time.
56	I	(Pulse)	S.REEL	Detects reel lock of supply reel and calculates tape remaining time.
57	I	Hi	ATF LOCK	Not used.
58	I	(Pulse)	C.SYNC	Inputs the reference signal for cylinder phase during recording.
59	I	(Pulse)	TACH(PG)	Inputs the comparison signal for cylinder phase during recording.
60	I	Hi	VIDEO DET	Detects no recorded portion of tape and stops the operation of linear tape counter.
61	I	(Pulse)	CYL.FG	inputs the comparison signal for cylinder speed during record and play and detetcs cylinder lock.
62	I	(Pulse)	CAPST.FG	Inputs a comparison signal for capsan speed during recording and playback and counts the tape counter.
63 64	O O	Hi Hi	LOAD UNLOAD	Control the loading motor.
65	O	Hi	LM.SLOW	Decreases the loading motor speed when the mechanism mode is changed to unloading from loading to remove tape slack.
66	O	Hi	REC	Sets the mode of the video circuit to record.
67	O	PWM	CAPST.SERVO	Controls the capstan phase and speed.
68	O	PWM	CYL.SERVO	Controls the cylinder phase and speed.
69	I	(Pulse)	CAPST.FG	Controls back spacing during assemble recording and is also used as a clock pulse for the linear tape counter.
70	I	(Pulse)	S.EDIT ON	Not used.
71	-	-	-	Not used. Connected to 5V.
72	-	-	B+(5V)	Connected to 5V.
73	-	-	GND	Grounded.
74	-	-	-	Not used.
75	O	Hi	HEAD SW	Not used. Connected to 5V.
76 77	O O	Hi Hi	CH2 REC CH1 REC	Control the video head during recording.
78	O	(Pulse)	ARTI.V.SYNC	Adds the artificial V.SYNC pulse to the video signal during trick play.
79 80	O O	(Pulse) (Pulse)	PILOT SEL.2 PILOT SEL.1	Selects the pilot signals during recording.

2-2. Sub System Control Microprocessor (IC902: S-μP)

Pin No.	I/O	Active Level	Abbreviation	Function
1	-	-	-	Not used. Connected to 5V.
2	-	-	GND(A)	Grounded.
3	I	Lo	RESET(Lo)	Initilizes IC902.
4	I	(Pulse)	OSC IN	Generate 4MHz clock pulse.
5	O	(Pulse)	OSC OUT	
6	-	-	GND	Grounded.
7	I	(Pulse)	CLOCK IN	Generate 32kHz clock pulse.
8	O	(Pulse)	CLOCK OUT	
9	I	Lo	TEST(Lo)	Not used. Connected to 5V.
10	-	-	B+(5V/3V)	Connected to 5V.
11	O	Hi	RESET(M)	Initializes IC901.
12	O	Hi	CS(M)	Activates IC901.
13	O	Hi	POWER LED	Not used.
14	O	Hi	VCR LED	
15	O	Hi	TALLY LED	Drives the tally indicator.
16	-	-	-	Not used.
17	O	Hi/Lo	FADE	Fades in and out the video and audio signals.
18	-	-	-	Not used.
20	-	-	-	
19	I	Lo/Hi	S.EDIT(Lo)	Detects the synchro. edit mode.
21	I	Lo	PAUSE SW(Lo)	Detects key operations of the PAUSE, STOP, FF, PB, REW and REC directly.
22	I	Lo	STOP SW (Lo)	
23	I	Lo	REW SW(Lo)	
24	I	Lo	PB SW(Lo)	
25	I	Lo	FF SW(Lo)	
26	I	Lo	REC SW(Lo)	
27	I	Lo	CAMERA SW(Lo)	Detects the POWER switch is set to "CAMERA".
28 - 42	-	-	-	Not used.
43	O	Hi/Lo	EDIT ON/OFF	Not used.
44	-	-	-	Not used.
45	-	-	-	
46	O	Hi	REC HB	Not used.
47	I	Hi	PB HB	Not used. Connected to 5V.
48	I	Lo	AV IN(Lo)	Not used. Grounded.
49	I	Lo	DATE ADVANCE SW(Lo)	Not used. Connected to 5V.
50	I	Lo	DATE SELECT SW(Lo)	Not used. Connected to 5V.
51	-	-	-	Not used. Grounded.
52	O	Hi	WIND SW	
53	O	Hi	MATRIX ON/OFF	Not used.
54	O	Hi	REC RUN	Not used.
55	I	(Pulse)	REQUEST(M-S)	Communicates with IC901.
56	I	Lo	BACKUP(Lo)	Enters backup mode when the 6V battery is removed.
57	O	Lo	RESET(Lo(T))	Not used.
58	I	Lo	VCR SW(Lo)	Not used.
59	I	0V - 5V	IR REMOTE(A/D)	Detects key operations by the output of the IR receiver.
60	-	-	-	Not used.
61	O	(Pulse)	DATA(S-M/S-CG)	Communicate with IC901 and IC902.
62	I	(Pulse)	DATA(M-S)	
63	O	(Pulse)	CLOCK(S-M/S-CG)	
64	I	(Pulse)	CLOCK(D-S)	Communicate with IC1210.
65	I	(Pulse)	DATA(D-S)	
66	O	(Pulse)	DATA(S-D)	
67	I	Hi	CS(D)	
68	-	-	-	Not used.
69	O	Hi	STROBE(CG)	Communicate with IC906.
70	O	Hi	CS(CG)	
71	O	Hi	AUDIO SEL.1	Not used.
72	O	Hi	AUDIO SEL.2	
73	-	-	B+(A)	Connected to 5V.
74	I	Hi	BILINGAL	Not used. Grounded.
75	I	Lo	MONO(Lo)	
76	I	Hi/Lo	Hi8/NORM.(Lo)	Sets the internal modes. These are grounded.
77	I	Hi/Lo	LP/SP(Lo)	
78	I	Hi/Lo	PAL/NTSC(Lo)	
79	I	Hi/Lo	SIMPLE/ROM(Lo)	
80	I	Hi/Lo	WRITE/READ(Lo)	

SERVO

1. GENERAL (Fig. 4)

During recording, the servo circuit makes the magnetic tape run at precisely the specified speed (1.4345 cm/s) to maintain the specified video track pitch (20.5μm), and rotates the video heads accurately at the rated speed (1,800 rpm) to keep the length of video tracks constant, moreover, it matches the position of the rotary video head precisely with the phase of the vertical sync signal in the video signal to be recorded, thus aligning the starts of video tracks at positions 6H before the vertical sync signal.

During playback, the servo circuit aligns the recorded video track precisely with the scanning of the video heads while rotating the video heads accurately at the rated speed (1,800 rpm).
For the above control, speed and phase controls are applied to the capstan motor which drives the tape and the cylinder motor which drives the rotary video heads. The speed control maintains the relative speed of the rotary video heads and the video tracks constant, absorbs uneveness in rotation and minimizes variations in the time axis. The phase control optimizes the tracking.
Table 4 shows the reference signals and feedback signals used for each control.

Table 4 Signals used in the Servo System

Motor	System	Mode	Reference Signal	Feedback Signal
Cylinder	Phase	Recording	1/2V.SYNC	PG
		Playback	REF.30Hz	
	Speed	Common	Cylinder FG (CYL.FG: 720Hz)	
Capstan	Phase	Recording	REF.210Hz	Capstan FG (CAPST.FG/4: 210Hz)
		Playback	4-frequency pilot	
	Speed	Common	Capstan FG (CAPST.FG: 840Hz)	

(1) 1/2V.SYNC Signal
Reference signal for cylinder phase control during recording. This is obtained by dividing the vertical sync signal separated from the video signal by two.
(2) REF.30Hz Signal
Reference signal for cylinder phase control during play. This is obtained by dividing the 16MHz clock pulse down to 30Hz.
(3) REF.210Hz Signal
Reference signal for capstan phase control during recording. This is obtained by dividing the 16 MHz clock pulse down to 210Hz.
(4) PG Pulse
Feedback signal for cylinder phase control. This is generated from a magnetic sensor on the FG sensor circuit board attached to the lower cylinder which detects the passing of the magnet installed approx. 100° before the CH2 video head on the upper cylinder. The frequency of the PG pulse is 30Hz when the cylinder motor rotates at 1,800 rpm.
(5) Cylinder FG (CYL.FG) Pulse
The signal used to detect the speed of the DD cylinder

motor. This is generated from the FG sensor circuit board attached to the lower cylinder which detects the passing of the magnet fitted to the rotor shaft of the DD cylinder motor. The frequency of the CYL.FG pulse is set as follows.

Recording/playback:	720Hz,
Still play:	716Hz
Forward search:	742Hz,
Reverse search:	697Hz

(6) Capstan FG (CAPST.FG) Pulse

The signal used to detect the speed of the DD capstan motor. This is divided by 4 to generate a feedback signal for capstan phase control during recording.

The CAPST.FG pulse is generated from an FG sensor attached to the chassis which detects the passing of a magnet fitted to the rotor shaft of the DD capstan motor. When the rated tape speed is maintained, the frequencies of the CAPST.FG pulse are set as follows.

Recording/playback:	840Hz,
Forward search (X9):	7,785Hz,
Reverse search (X7):	5,700Hz,
Fast forward (X15):	13,298Hz,
Rewind (X15):	11,861Hz

(7) 4-frequency Pilot Signals

Feedback signal for capstan phase control during play. One of 4-frequency pilot signals is selected, synchronized with the head switching signal (SW30Hz), in the specified order for each field during recording, and is recorded together with other RF signals.

During playback, the main RF signal component and the pilot signal components from both adjacent tracks are reproduced by the rotary video heads since there is no azimuth loss as the frequency of the pilot signal is lower, and the phase of the capstan is controlled so the levels (crosstalk components) of the pilot signals reproduced by both adjacent tracks are always equal.

The frequencies of pilot signals are specified as f1 = 6.5 fH, f2 = 7.5fH, f3 = 10.5fH and f4 = 9.5fH; f1 and f3 are recorded by the CH1 video head, and f2 and f4, by the CH2 head.

The frequency of the clock pulse for generating pilot signals is 5.947452MHz (378fH). The specified ATF (Automatic Track Finding) servo system is used for phase control of the capstan motor during playback.

2. CONFIGURATION OF CIRCUITS (Fig. 4)

The servo circuit consists of six ICs (IC901 and IC601to IC606).

(1) Main System Control Microprocessor (IC901: M-μP)

This controls the speed and phase of the cylinder motor during recording and playback, speed of the capstan motor during recording and playback, and phase of the capstan motor during recording.

(2) ATF (Automatic Track Finding) Servo Circuit (IC601: ATF SERVO)

This controls the phase of the capstan motor during playback using recorded pilot signals. It also generates the pilot signals, recording and reference, during recording and playback.

(3) Amplifier (IC602: PG AMP)

This amplifies the PG pulse.

(4) Motor Driver (IC603: MOTOR DRIVE)

This drives the cylinder motor and amplifies the CYL.FG pulse.

(5) Motor Driver (IC604: MOTOR DRIVE)

This drives the capstan motor and amplifies the CAPST.FG pulse.

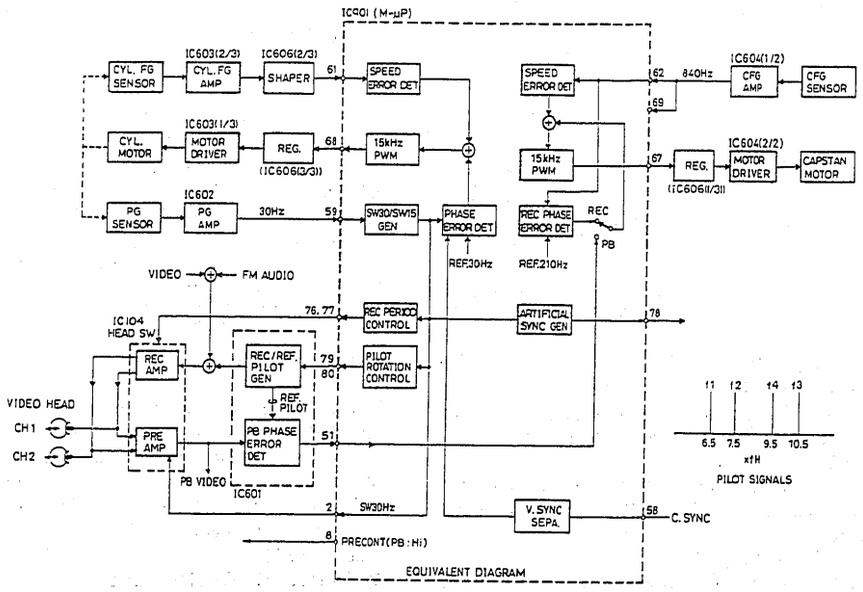

Fig. 4 Circuit Configuration of Servo Circuit

(6) Shaper (IC606: SHAPER) and Switching Regulator (SWR)

IC606 amplifies the CYL.FG pulse and regulates the PWM signal generated by IC901 with the switching regulator.

VIDEO

This consists of six ICs and processes the video signal as follows.

(1) Luma Signal Processing Circuit (IC101: LUMA PROCESS)

This consists of recording and playback circuits. It provides a comb filter which separates the luma and chroma signals from the external video signal supplied to the A/V IN/OUT connector (JK001).

It adds the INFOS character signal generated by a character signal generator (IC906: CHARA. GEN) to the recording and playback signals.

The operation mode is controlled by a main system control microprocessor (IC901: M-μP).

(2) Chroma Signal Processing Circuit (IC102: CHROMA PROCESS)

This consists of recording and playback circuits. It composes a feedback type comb filter with IC101 and attenuates crosstalk component from adjacent tracks.

(3) Head Switching Circuit (IC104: HEAD SWITCH)

This consists of recording amplifiers and preamplifiers and supplies the recording current to the CH1 and CH2 video heads. It also produces a continuous signal during playback.

(4) CCD 1H Delay Circuit (IC105: CCD 1H DELAY)

This delays the input signal by 1H for the comb filter and dropout compensation.

(5) Character Signal Adder (IC108: CHARA. ADD)

This adds the DATE character signal to the camera luma signal during recording.

(6) Input Signal Selection Circuit (IC109: INPUT SELECT)

This selects the input signal depending on the mode, recording and playback.

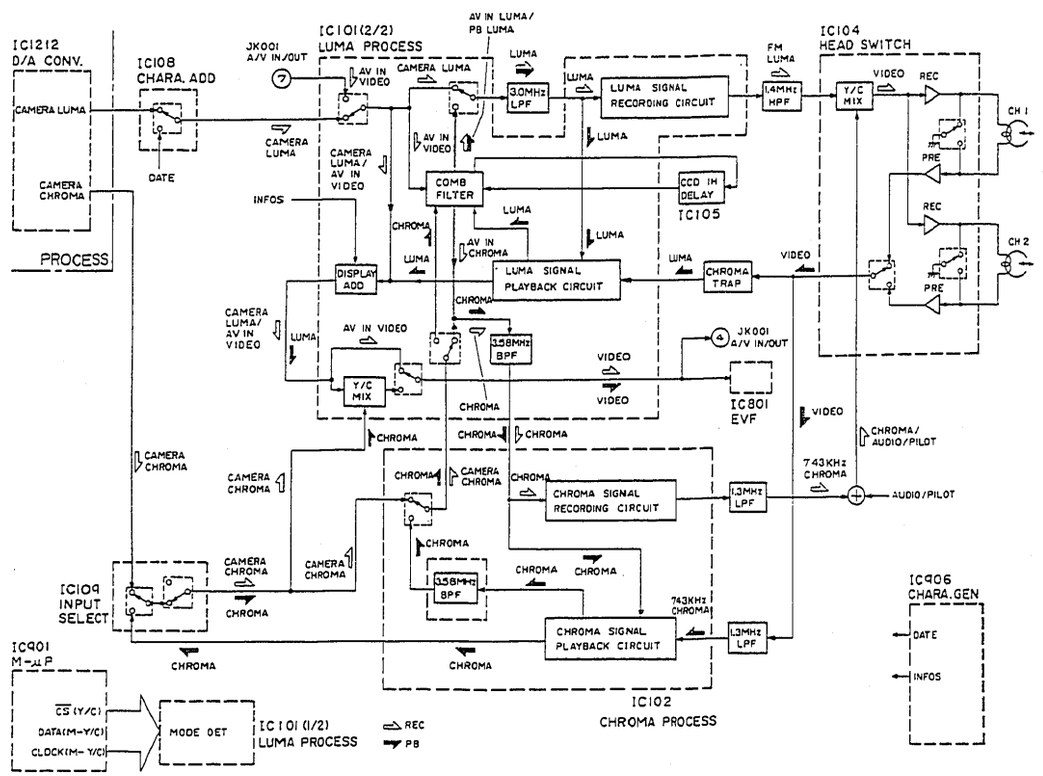

Fig. 5 Simplified Video Signal Processing Circuit

AUDIO

This uses the monaural FM recording system; the signal is frequency modulated by the carrier of 1.5MHz with deviation of 100kHz.
The audio signal is processed by IC401 (See Fig. 6).

Audio Signal Processing Circuit (IC401: AUDIO PROCESS)

This consists of input signal selection circuit which selects the signal from the built-in microphone or an external audio signal supplied to the A/V IN/OUT connector (JK001), recording and playback circuits.

A noise reduction system is provided. It is 2-to-1 compression-expansion type noise reduction. The audio signal is compressed to 1/2 (in decibels) by the noise reduction circuit (COMPRESS/EXPAND) during recording and expanded two times during playback. At the same time, fixed emphasis is applied to reduce high frequency noise.
The recording audio signal is mixed with the video and pilot signals and then supplied to the head switching circuit in the video signal processing circuit.

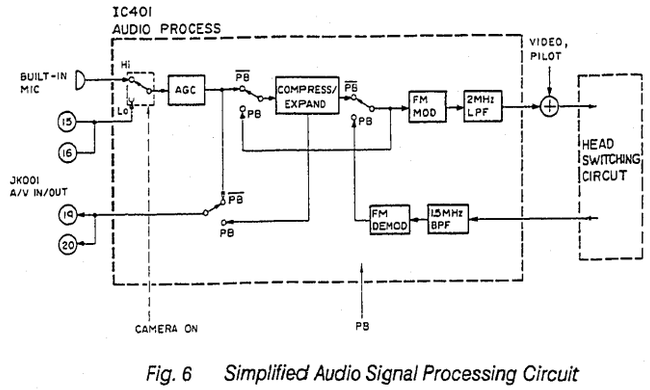

Fig. 6 Simplified Audio Signal Processing Circuit

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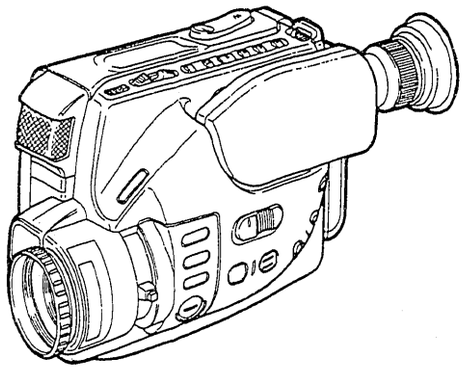
HITACHI

SERVICE MANUAL

SUPPLEMENT



TK | No. 3691E

VM-E23A(U,C),(PX)

Technical Data

MANUAL RELATED TO THE VM-E23A

TITLE	MODEL	MANUAL No.
Technical Data	VM-E23A	No. 3552E
Technical Information	VM-E23A	No. 3554E
POWER ADAPTER CHARGER	VM-AC80A	No. 3311E

NOTE:

This manual is a supplement to the VM-E23A Technical Data (No. 3552E). Since this manual shows only changes and corrections, use it together with the above Technical Data manual.

8

SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine Hitachi replacement parts. Especially critical parts in the power circuit block should not be replaced with other makers'. Critical parts are marked with ⚠ in the schematic diagram.
2. Before returning a repaired unit to the customer, the service technician must thoroughly test the unit to ascertain that it is completely safety operate without danger of electrical shock.

X-RAY RADIATION

The primary source or X-ray radiation in this viewfinder is the picture tube. The tube used in this view-finder is especially constructed to limit X-ray radiation emission. For continued X-ray radiation protection, the replacement tube must be the same type as the original, Hitachi approved one.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

8mm VIDEO CAMERA/RECORDER

April 1992 Video Systems Operation

CONTENTS

LIST OF CHANGES TO THE VM-E23A MANUAL

Page	Details of Change
3-1	·Correction of illustration in No. 8 of JIG AND TAPES FOR ADJUSTMENT. ·No. 21 is added to JIGS AND TAPES FOR ADJUSTMENT. ·Parts No. of No. 11 - 13 in HOW TO USE THE NEW JIGS AND TOOLS are changed.
6-1	Address: 1B, No. 107 added.

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HOW TO USE THE NEW JIGS AND TOOLS 3-1
ATF JIG 3-2
SERVICING POSITION 3-2

CHAPTER 5 SCHEMATIC DIAGRAM AND CIRCUIT BOARD DIAGRAM

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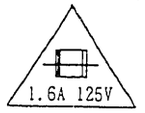
CHAPTER 6 EXPLODED VIEW

Cabinet Section 6-1

CAUTION AGAINST FUSE REPLACEMENT MARKING /
MESURE DE PRÉCAUTION À PRENDRE À PROPOS DES MARQUES DE FUSIBLE / :

CAUTION : FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH SAME TYPE AND SAME RATING FUSE IN ACCORDANCE WITH THE FUSE SYMBOL MARKING.
MESURE DE PRÉCAUTION : POUR ASSURER À L'APPAREIL UNE PROTECTION PERMANENTE CONTRE TOUT RISQUE D'AMORÇAGE ÉLECTRIQUE, REMPLACER UNIQUEMENT PAR UN FUSIBLE DE MÊME TYPE ET DE MÊME CATÉGORIE CONFORMÉMENT AUX MARQUES INDIQUÉES SUR LE FUSIBLE.

* Example / * Exemple



This symbol indicates Fast Operating Type 1.6A, 125V Fuse.
Ce symbole se rapporte à un fusible à fusion rapide de type 1,6A, 125V

CIRCUIT BOARD CHANGE HISTORY TABLE

The table below shows the pattern numbers of the circuit boards shown in the service manuals and the serial numbers of units in which each circuit board is used.
The circuit boards indicated [ ] are shown in the manual issued previously.
The circuit boards indicated [ ] are shown in this manual.
Check the serial number of the unit to be serviced and select the corresponding circuit board diagram from the table below to refer to it.

CAMERA SECTION

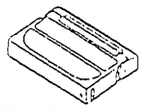
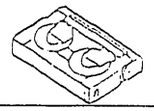
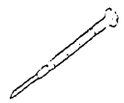
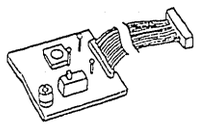
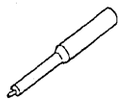
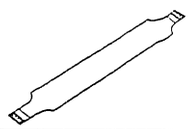
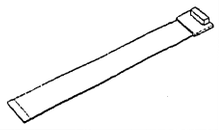
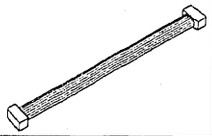
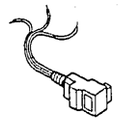
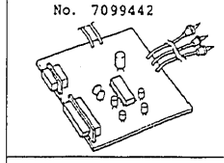
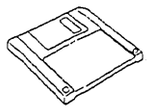
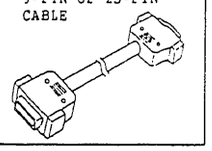
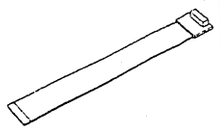
Name of Board	Name of Model	Pattern No. and applicable serial No. 154426-5	154426-6	154426-7, 8
SENSOR BOARD	VM-E23A	XXX00001 ~XXX05000	XXX05001 ~XXX08000	After XXX08001
	VM-E23A(PX)	XXX00001 ~XXX01200	XXX01201 ~XXX04800	After XXX04801
PROCESS BOARD	VM-E23A	XXX00001 ~XXX05000	XXX05001 ~XXX08000	After XXX08001
	VM-E23A(PX)	XXX00001 ~XXX01200	XXX01201 ~XXX04800	After XXX04801

VCR SECTION

Name of Board	Name of Model	Pattern No. and applicable serial No. 154428-5	154428-7	154428-8	154428-9	154429-1
MAIN BOARD	VM-E23A	XXX00001 ~XXX05000	Not used	XXX05001 ~XXX08000	XXX08001 ~XXX15500	After XXX15501
	VM-E23A(PX)	XXX00001 ~XXX01200	Not used	Not used	XXX01201 ~XXX01800	After XXX01801

JIG AND TAPES FOR ADJUSTMENT

Note: Mark "※" is new jigs and tools.

1. ALIGNMENT TAPE COLOR BAR/400Hz (20HSC-2) No. 7099231 	2. CASSETTE TORQUE METER SRK-8T-132 No. 7099235 SRK-8T-112 No. 7099385 	3. MASTER PLANE No. 7099237	4. REEL DISK HEIGHT JIG No. 7099238
5. SPECIAL DRIVER No. 7099239 	6. 0.7mm HEXAGONAL WRENCH No. 7099316	7. ATF JIG No. 7099386 	8. BACKFOCUS ADJ. DRIVER No. 7099370 
9. C12 LIGHT BALANCING FILTER No. 7099369	10. 2-PIN EXTENSION CABLE No. 7099283	※11. 18-PIN EXTENSION CABLE No. 7099451	※12. 10-PIN EXTENSION CABLE No. 7099452 
※13. 7-PIN EXTENSION CABLE No. 7099453 	※14. 4-PIN EXTENSION CABLE No. 7099454 	※15. 18-PIN EXTENSION CABLE No. 7099455	※16. DSP AV OUTPUT CABLE No. 7099456 
17. DSP JIG No. 7099442 	18. CAMERA ADJ. FLOPPY DISK 	19. PERSONAL COMPUTER	20. PERSONAL COMPUTER 9-PIN or 25-PIN CABLE 
21. 16-PIN EXTENSION CABLE No. 7099390 			

HOW TO USE THE NEW JIGS AND TOOLS

No.	NAME OF JIG & TOOLS	PARTS No.	HOW TO USE (PURPOSE OF USE)
11	18-PIN EXTENSION CABLE	7099451	- Installed between the main circuit board and process circuit board. - Used when the camera section is removed from the VCR section to adjust, etc.
12	10-PIN EXTENSION CABLE	7099452	- Installed between the regulator block and process circuit board. - Used when the camera section is removed from the VCR section to adjust, etc.
13	7-PIN EXTENSION CABLE	7099453	- Installed between the process circuit board and control switch block. - Used when the control switch block is removed from the process circuit board to adjust, etc.
14	4-PIN EXTENSION CABLE	7099454	- Installed between the EVF and process circuit board. - Used when the EVF is removed from the process circuit board to adjust, etc.
15	18-PIN EXTENSION CABLE	7099455	- Installed between the sensor circuit board and process circuit board. - Used when the process circuit board is removed from the sensor circuit board to adjust, etc.
16	DSP AV OUTPUT CABLE	7099456	- Used when the camera section (DSP circuit adjustment.

ATF JIG

1. ATF JIG

The ATF jig can be used in two way as follows.
The unassembled VCR block can be operated even if the 8mm video camera/recorder is not set to the test mode.

1-1. SETTING THE HEAD SWITCHING POINT AND POWER SHUT OFF LEVEL

Connect the ATF jig to CN612 on the main circuit board and supply power under the specified conditions. The head switching point and power shut off level can be set. Refer to the VCR adjustment in CHAPTER 4 for the setting methods.

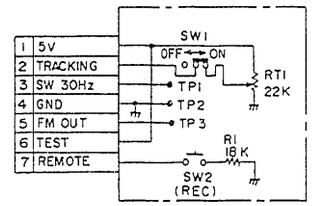
1-2. RELEASING THE AUTO TRACKING FUNCTION

Connect the ATF jig to CN612 on the main circuit board and set SW1 on the ATF jig to "ON".
The auto tracking function will be released. Used RT1 on the ATF jig as the tracking control.

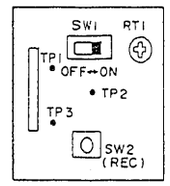
Caution: Be sure to set SW1 on the ATF jig to "OFF" when setting the head switching point and power shut off level.

ATF Jig Schematic

SW2 has the same function as the RECORD button.



ATF Jig Parts Location



SERVICING POSITION (WHEN OBSERVING WAVEFORM AND VOLTAGE)

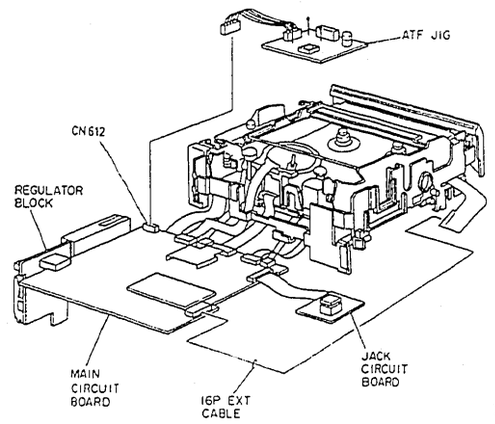


Fig. 3-A

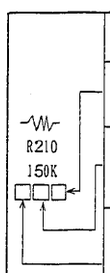
CHAPTER 5 SCHEMATIC DIAGRAM AND CIRCUIT BOARD DIAGRAMS

WHEN USING THIS SERVICE REFERENCE MATERIAL

1. How to Read Abbreviations

Values, dielectric resistances (power capacitances), tolerances, grades of resistors (excluding variable resistors, etc.) and capacitors are indicated in the schematic diagrams using abbreviations. Collate these abbreviations and the following tables for reading abbreviations to replace parts correctly.

[RESISTORS]

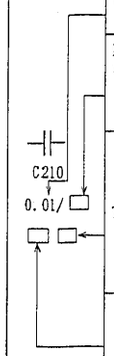


Value	No indication ····· ohm K ····· kohm
Tolerance	No indication ····· ± 5% K ····· ±10% M ····· ±20%
Power capacitance	No indication ····· 1/8W (All capacitances other than 1/8W are indicated in schematic diagrams with W omitted.)
Type	No indication ····· Carbon film fixed RC ····· Carbon solid RW ····· Power-type wirewound solid RS ····· Metal oxide film solid RN ····· Metal film solid

Example

R210
150K ····· 150 kohm, carbon solid
RC.1/2.K 1/2W, ±10%

[CAPACITORS]



Value	No indication ····· μF P ····· PF
Dielectric resistance	No indication ····· 50WV (All resistances other than 50WV and those of electrolytic capacitors are indicated with WV omitted.)
Tolerances	No indication ····· ±10% J ····· ± 5% M ····· ±20% C ····· ±0.25PF Z ····· +80%-20% (No indication with electrolytic capacitors. (excluding tantalum and high stability electrolytic capacitors.)
Type	No indication ··· Ceramic, general electrolytic (see circuit symbol to distinct from ceramic.) MYL ····· Mylar (Polyester film) STY ····· Styrol TA ····· Tantalum KU ····· High stability electrolytic MP ····· Metalized paper

Example

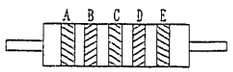
C210
0.01/25 ····· Mylar, 0.01μF, 25WV
MYL.J ±5%

2. Markings in Schematic and Circuit Board Diagrams

(1) Parts with marks "■" attached to circuit numbers in the schematic and circuit board diagrams are discrete components.
(2) Parts with marks "●" attached to circuit numbers in the schematic and circuit board diagrams are chip components.
(3) Parts with marks (Z) in the circuit board diagrams are leadless jumpers.

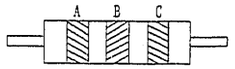
3. How to Read Capacitance of Resistance-Type Capacitors and Coils

[CAPACITOR]



CAPACITY : (10A+B)×C (PF)
TOLERANCE : D
RATED VOLTAGE : BODY COLOR
PINK : 25V
GREEN : 50V
CHARACTERISTICS : E

[COIL]



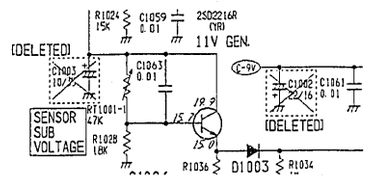
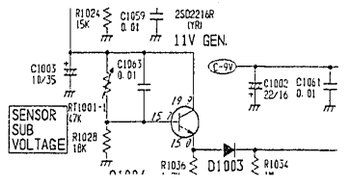
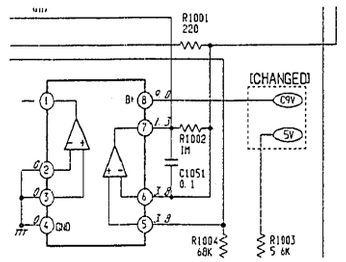
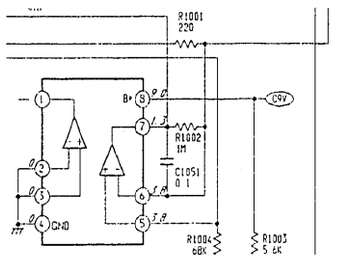
INDUCTANCE : (10A+B)×C (μH)

COLOR	A, B	C	D	E
Black	0	10^0	±20%	For temperature compensation
Brown	1	10^1		
Red	2	10^2		
Orange	3	10^3		
Yellow	4	10^4		
Green	5	10^5		
Blue	6			
Violet	7			
Gray	8		±30%	High dielectric constant type
White	9			For temperature compensation
Gold		10^{-1}	± 5%	
Silver		10^{-2}	±10%	High dielectric constant type

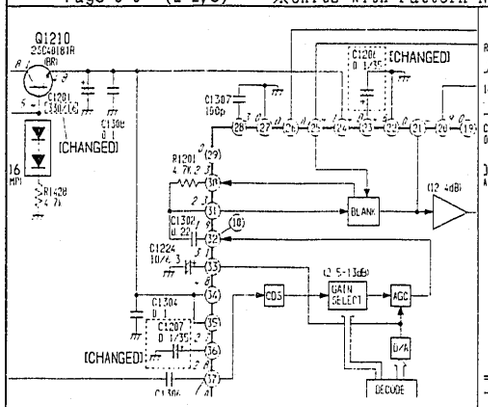
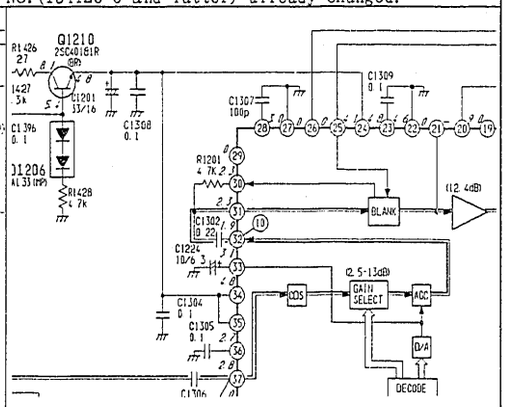
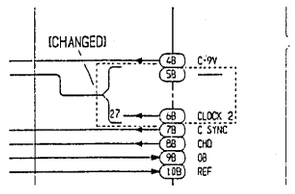
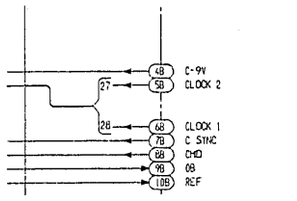
4. Cautions on Use of MOS ICs

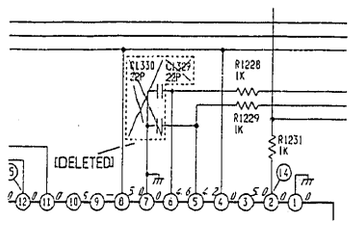
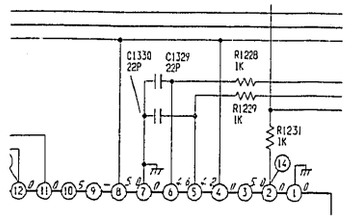
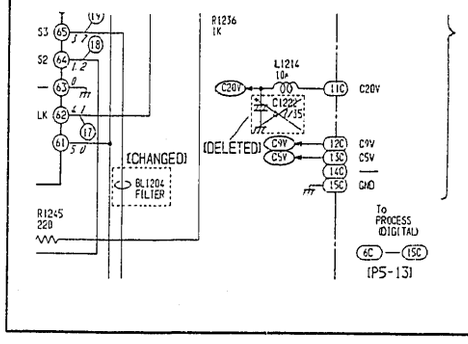
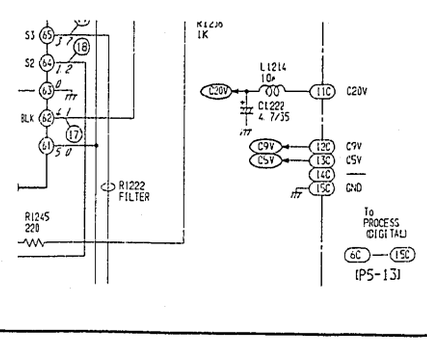
(1) MOS ICs are inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during storage. Avoid removing ICs from this foam, placing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
(2) High voltages may be applied during soldering caused by leakages from the soldering iron, so be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
(3) The human body and clothes made of synthetic fibers or nylon gloves may be charged with several thousands volts of static electricity because of friction, so workers should be grounded.

1. SENSOR Schematic Diagram (schematic on page 5-6 in Service Manual.)
※Units with Pattern No.(154426-7 and latter) already changed.
(Only the chenged section are shown in the SENSOR schematic.)

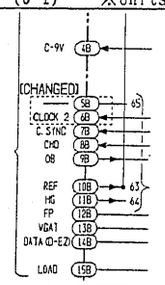
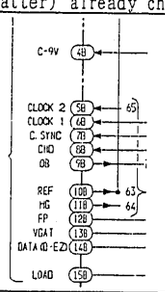
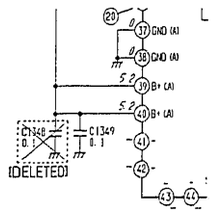
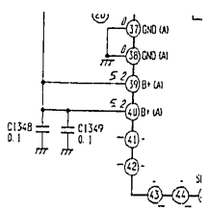
After Change	Before Change
Page 5-6 (E-2)	
	
Page 5-6 (C-3)	
	

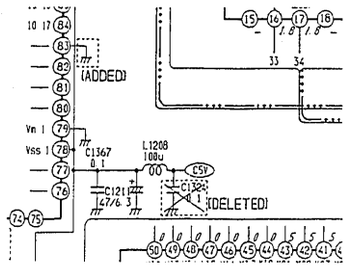
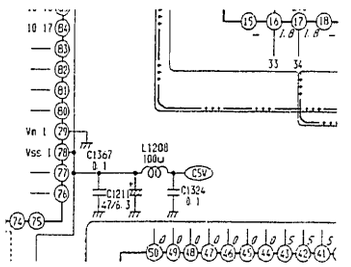
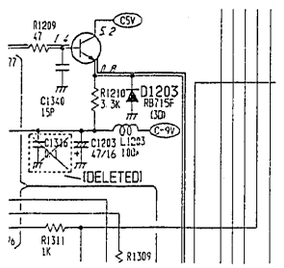
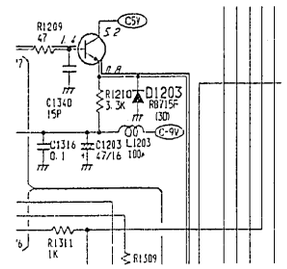
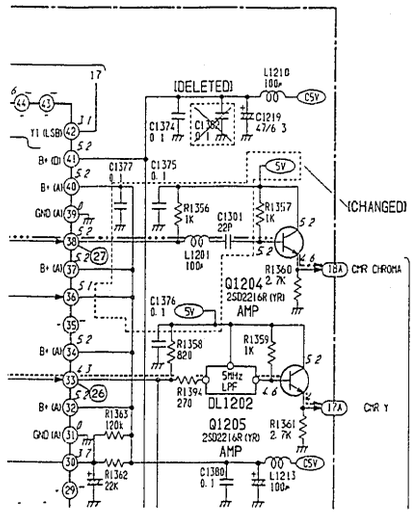
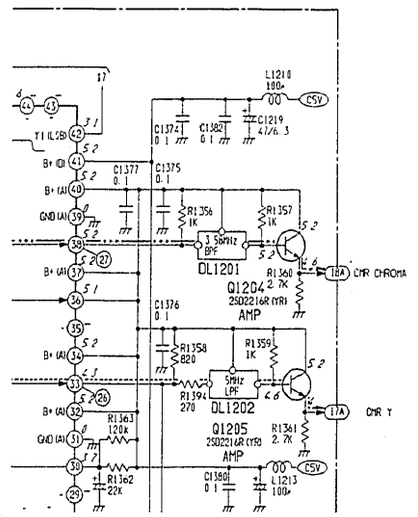
2. PROCESS(SENSOR DRIVE SECTION) Schematic Diagram (schematic on pages 5-9 to 5-10 in Service Manual.)
(Only the chenged section are shown in the SENSOR DRIVE schematic.)

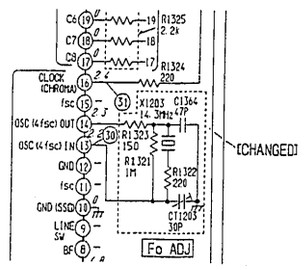
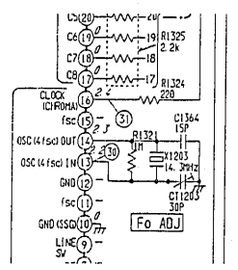
After Change	Before Change
Page 5-9 (E-2,3) ※Units with Pattern No.(154426-6 and latter) already changed.	
	
Page 5-10 (D-7) ※Units with Pattern No.(154426-6 and latter) already changed.	
	

After Change	Before Change
Page 5-10 (D-5) ※Units with Pattern No.(154426-7 and latter) already changed.	
	
Page 5-10 (B-7) ※Units with Pattern No.(154426-7 and latter) already changed.	
	

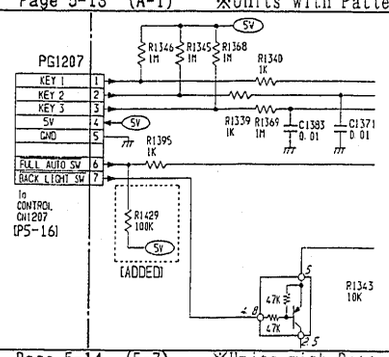
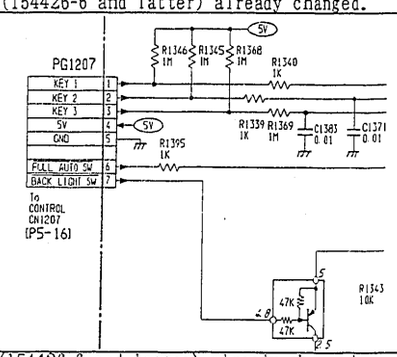
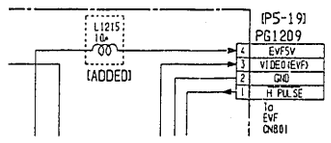
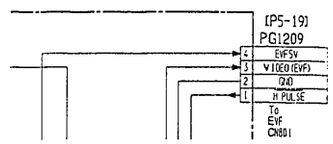
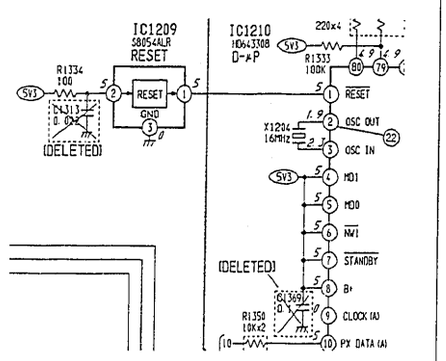
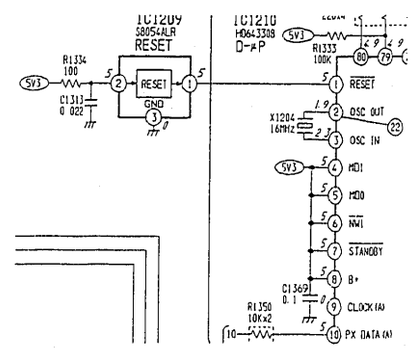
3. PROCESS(PROCESS SECTION) Schematic Diagram (schematic on pages 5-11 to 5-12 in Service Manual.)
(Only the chenged section are shown in the PROCESS schematic.)

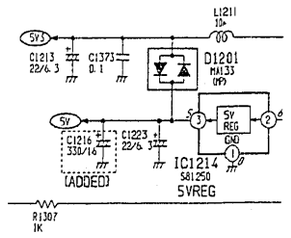
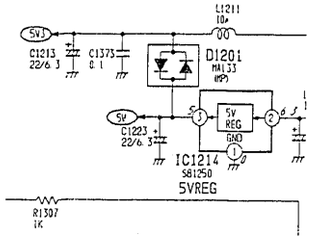
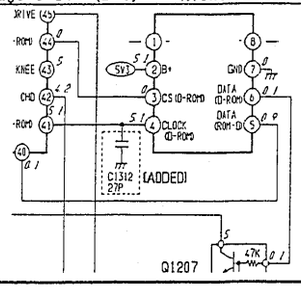
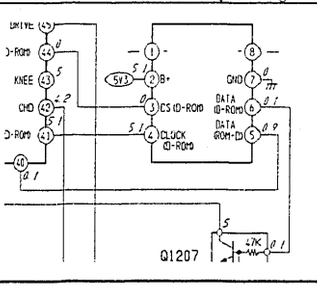
After Change	Before Change
Page 5-11 (C-1) ※Units with Pattern No.(154426-6 and latter) already changed.	
	
Page 5-11 (A-2) ※Units with Pattern No.(154426-6 and latter) already changed.	
	

After Change	Before Change
Page 5-11 (D-5) ※Units with Pattern No.(154426-7 and latter) already changed.	
	
Page 5-11 (D-1) ※Units with Pattern No.(154426-7 and latter) already changed.	
	
Page 5-12 (E-7) ※Units with Pattern No.(154426-7 and latter) already changed.	
	

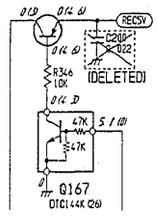
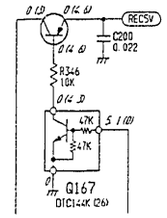
After Change	Before Change
Page 5-12 (B-7) ※Units with Pattern No.(154426-7 and latter) already changed.	
	

4. PROCESS(DIGITAL SECTION) Schematic Diagram (schematic on pages 5-13 to 5-14 in Service Manual.)
(Only the chenged section are shown in the DIGITAL schematic.)

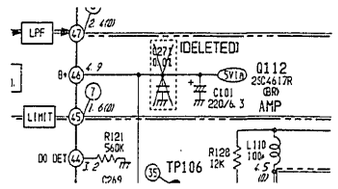
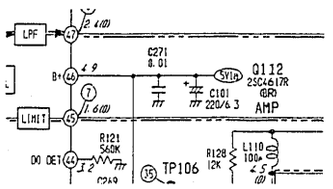
After Change	Before Change
Page 5-13 (A-1) ※Units with Pattern No.(154426-6 and latter) already changed.	
	
Page 5-14 (E-7) ※Units with Pattern No.(154426-6 and latter) already changed.	
	
Page 5-13 (D-3) ※Units with Pattern No.(154426-7 and latter) already changed.	
	

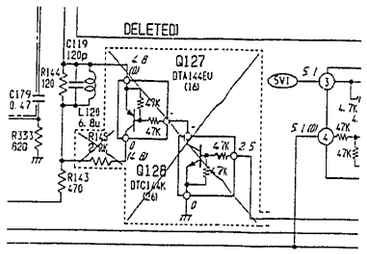
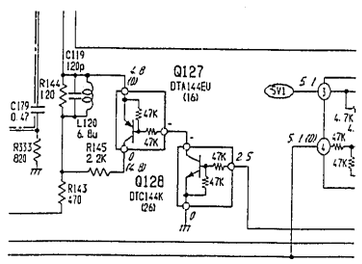
After Change	Before Change
Page 5-14 (D-6) ※Units with Pattern No.(154426-7 and latter) already changed.	
	
Page 5-14 (B-6) ※Units with Pattern No.(154426-7 and latter) already changed.	
	

5. MAIN(PRE AMP SECTION) Schematic Diagram (schematic on page 5-31 in Service Manual.)
※Units with Pattern No.(154429-1 and latter) already changed.
(Only the chenged section are shown in the PRE AMP schematic.)

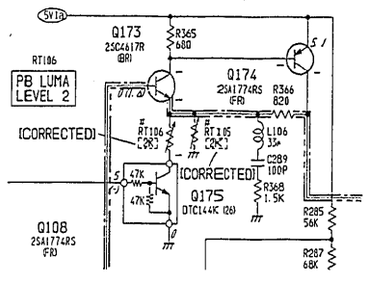
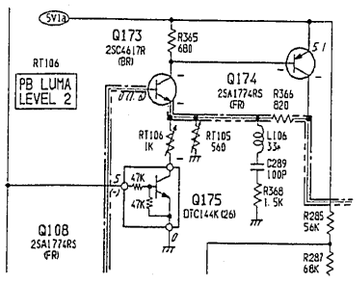
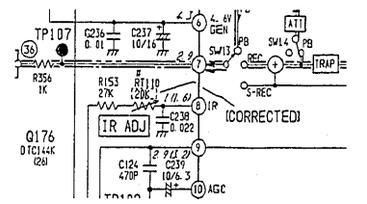
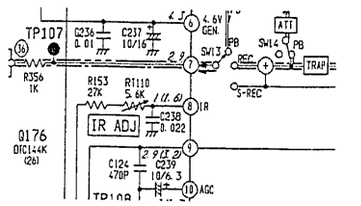
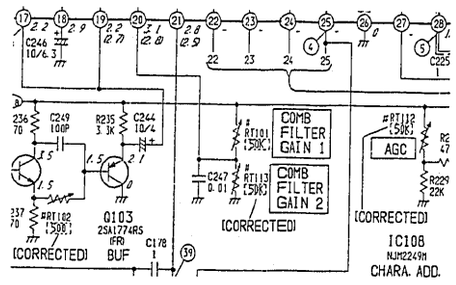
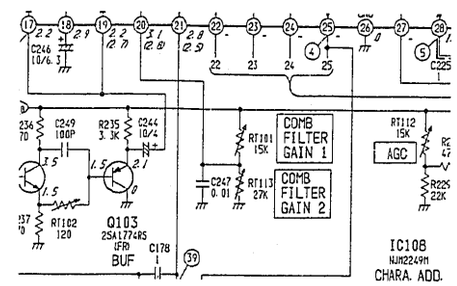
After Change	Before Change
Page 5-31 (D-2)	
	

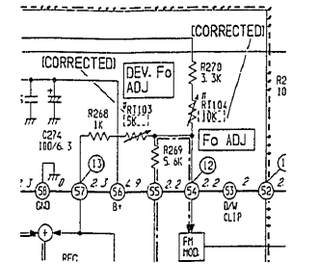
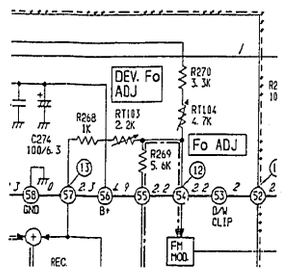
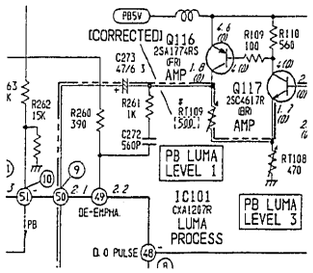
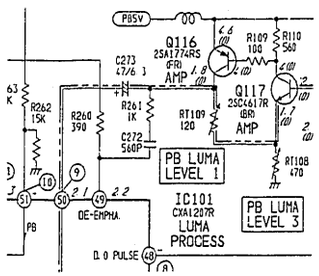
6. MAIN(LUMINANCE SECTION) Schematic Diagram (schematic on pages 5-33 to 5-34 in Service Manual.)
※Units with Pattern No.(154429-1 and latter) already changed.
(Only the chenged section are shown in the LUMINANCE schematic. Refer to pages 5-10 to 5-11 for the entire LUMINANCE schematic.)

After Change	Before Change
Page 5-34 (D-6)	
	

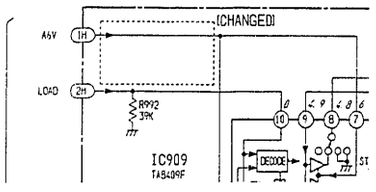
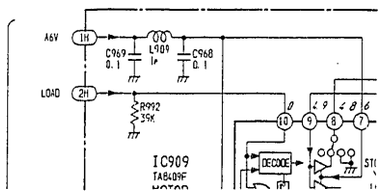
After Change	Before Change
Page 5-34 (A-6)	
	

(The following shown the corrections of the LUMINANCE schematic. Refer to pages 5-10 to 5-11 for the entire LUMINANCE schematic.)

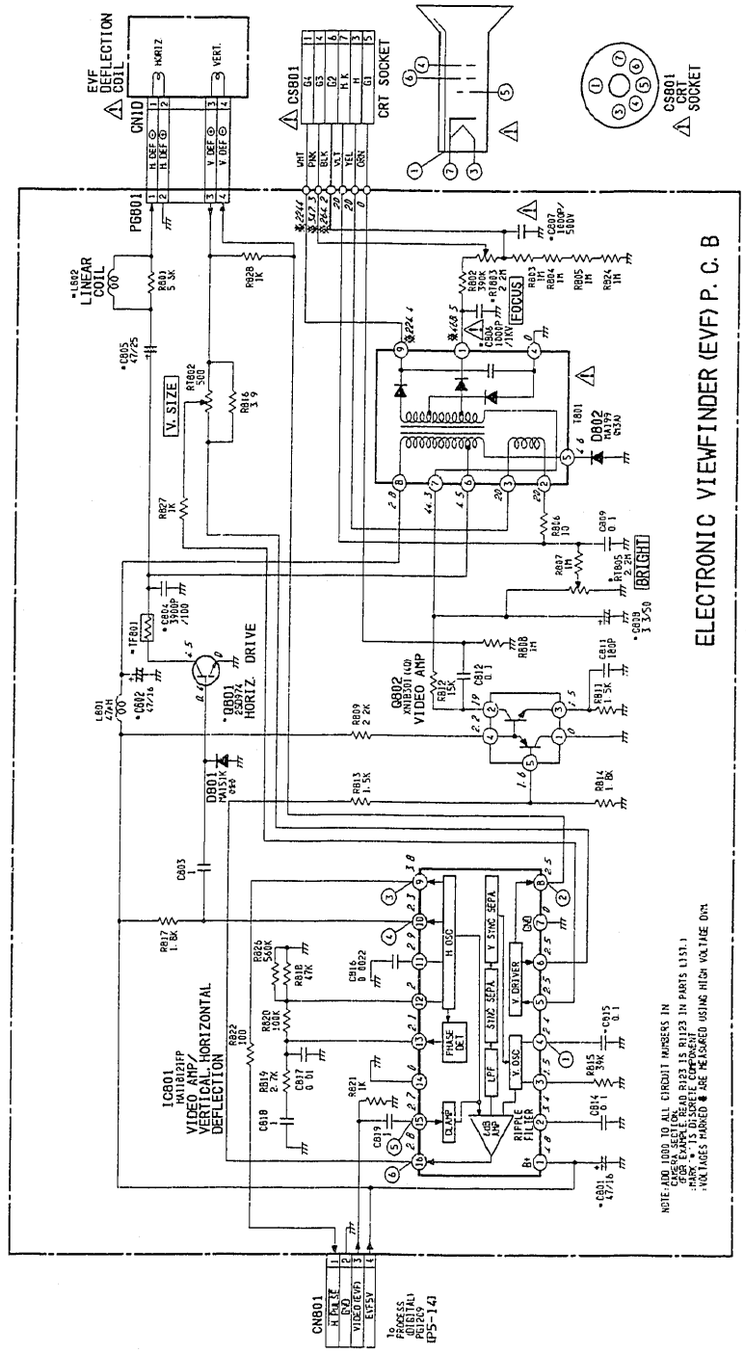
After Correction	Before Correction
Page 5-33 (D-2)	
	
Page 5-33 (D-3)	
	
Page 5-33 (B-4,5)	
	

After Change	Before Change
Page 5-34 (E-5)	
	
Page 5-34 (E-6)	
	

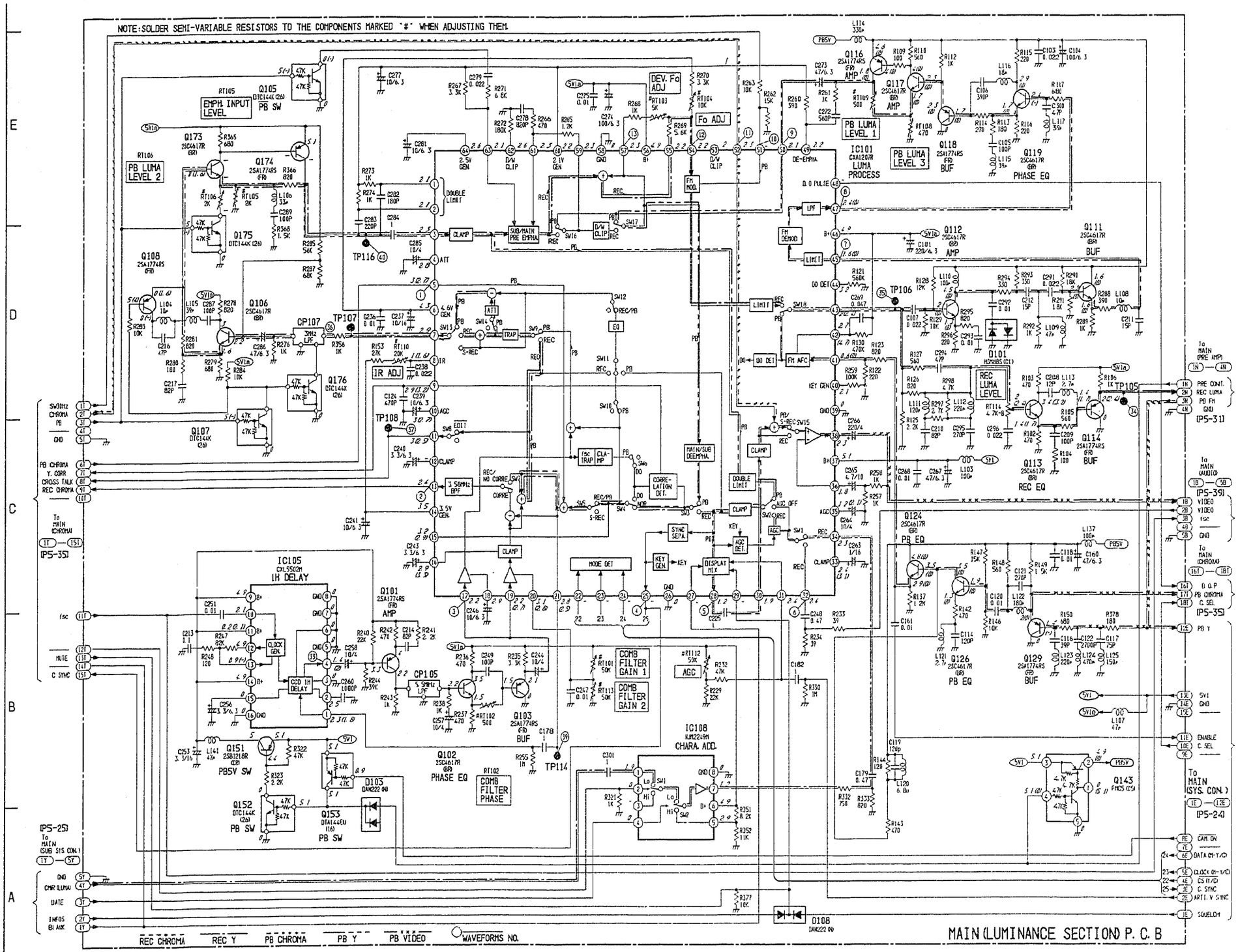
7. MAIN(TROUBLE SENSOR SECTION) Schematic Diagram (schematic on page 5-40 in Service Manual.)
※Units with Pattern No.(154429-1 and latter) already changed.
(Only the chenged section are shown in the TROUBLE SENSOR schematic.)

After Change	Before Change
Page 5-40 (E-6)	
	

ELECTRONIC VIEWFINDER (EVF) SCHEMATIC DIAGRAM

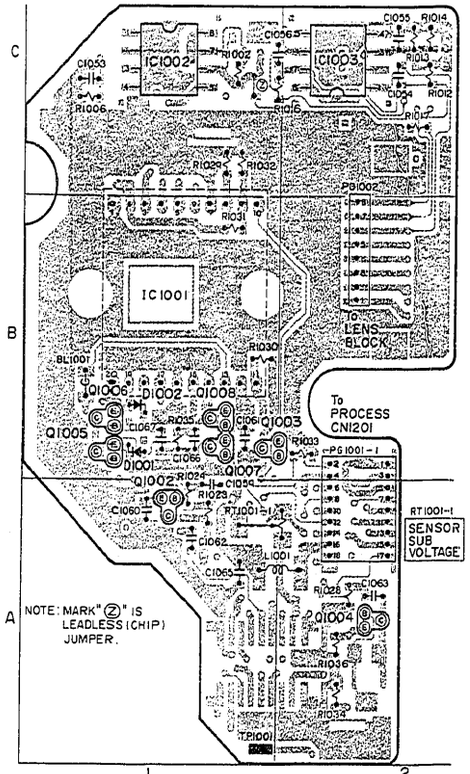


MAIN (LUMINANCE SECTION) SCHEMATIC DIAGRAM

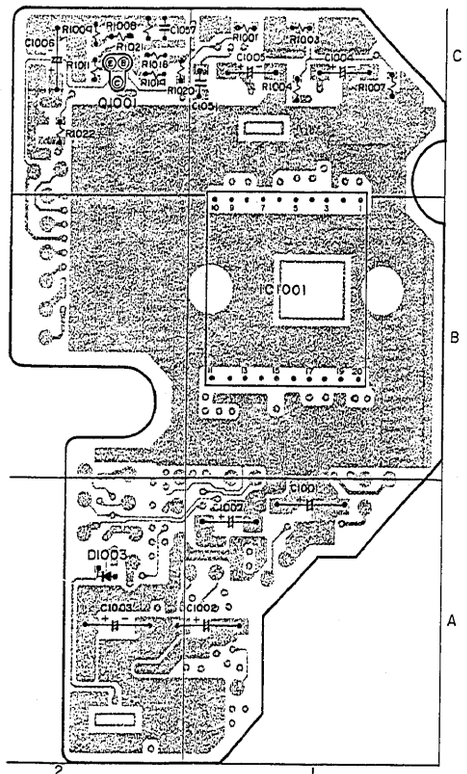


LUMINANCE 5-10 5-11 LUMINANCE

SENSOR CIRCUIT BOARD DIAGRAM [PATTERN No. 154426-6]

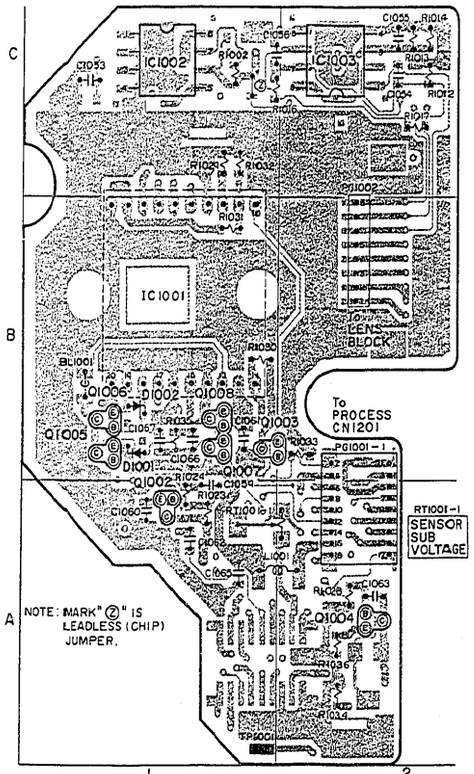


SENSOR P.C.B
-SIDE A-
[PATTERN No.154426-6]

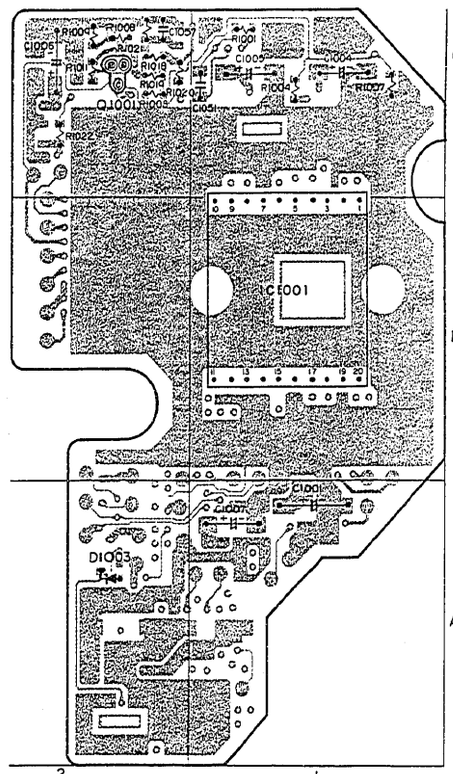


SENSOR P.C.B
-SIDE B-

SENSOR CIRCUIT BOARD DIAGRAM [PATTERN No. 154426-7, 8]



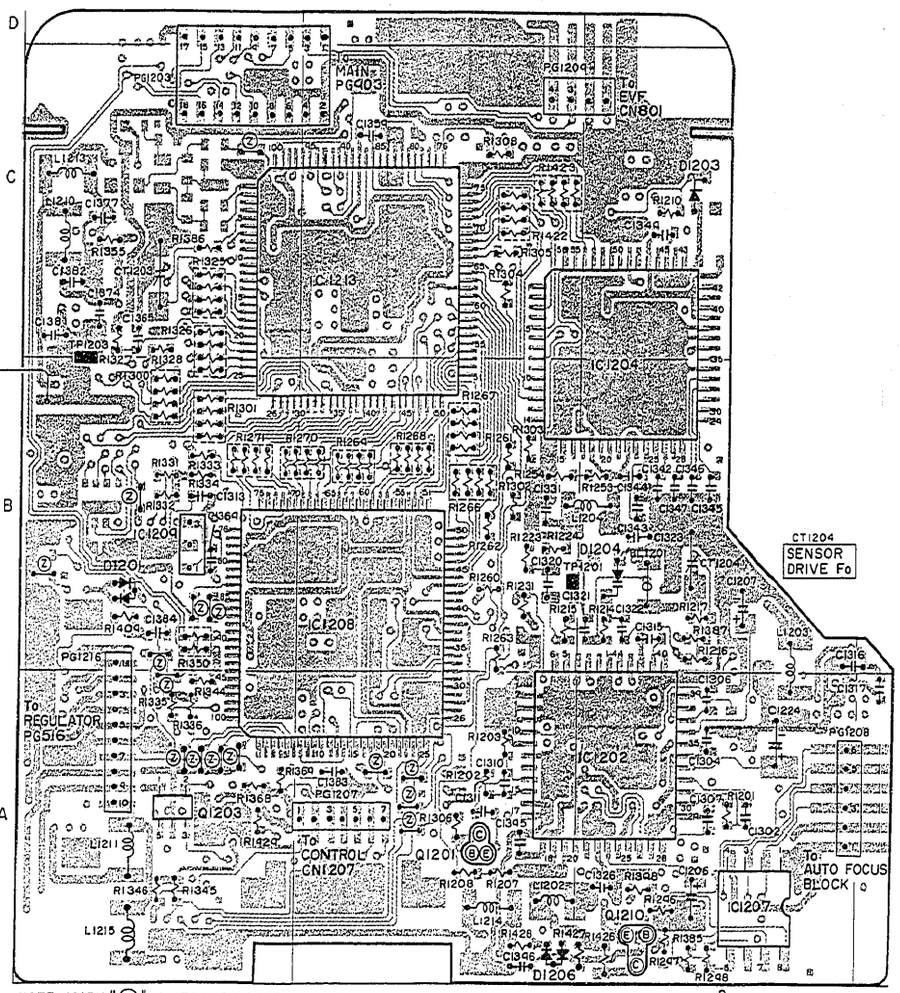
SENSOR P.C.B
-SIDE A-
[PATTERN No.154426-7,8]



SENSOR P.C.B
-SIDE B-

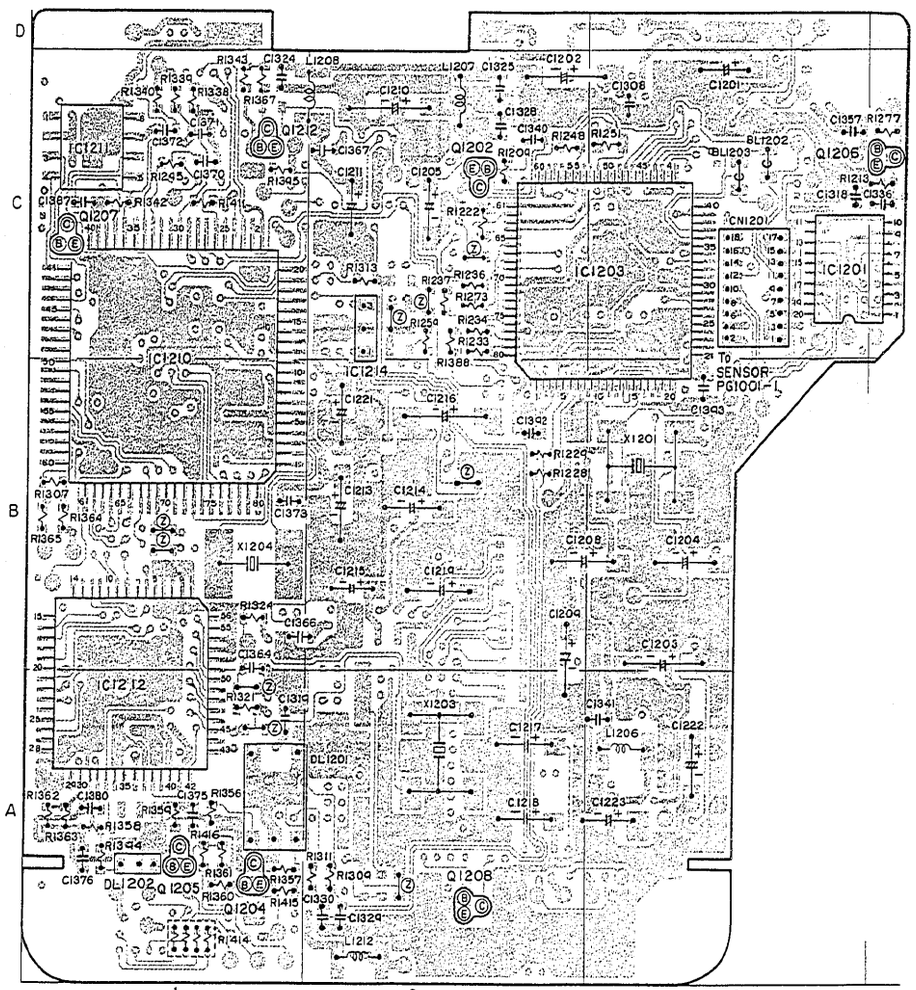
SENSOR 5-12 5-13 SENSOR

PROCESS CIRCUIT BOARD DIAGRAM [PATTERN No. 154426-6]



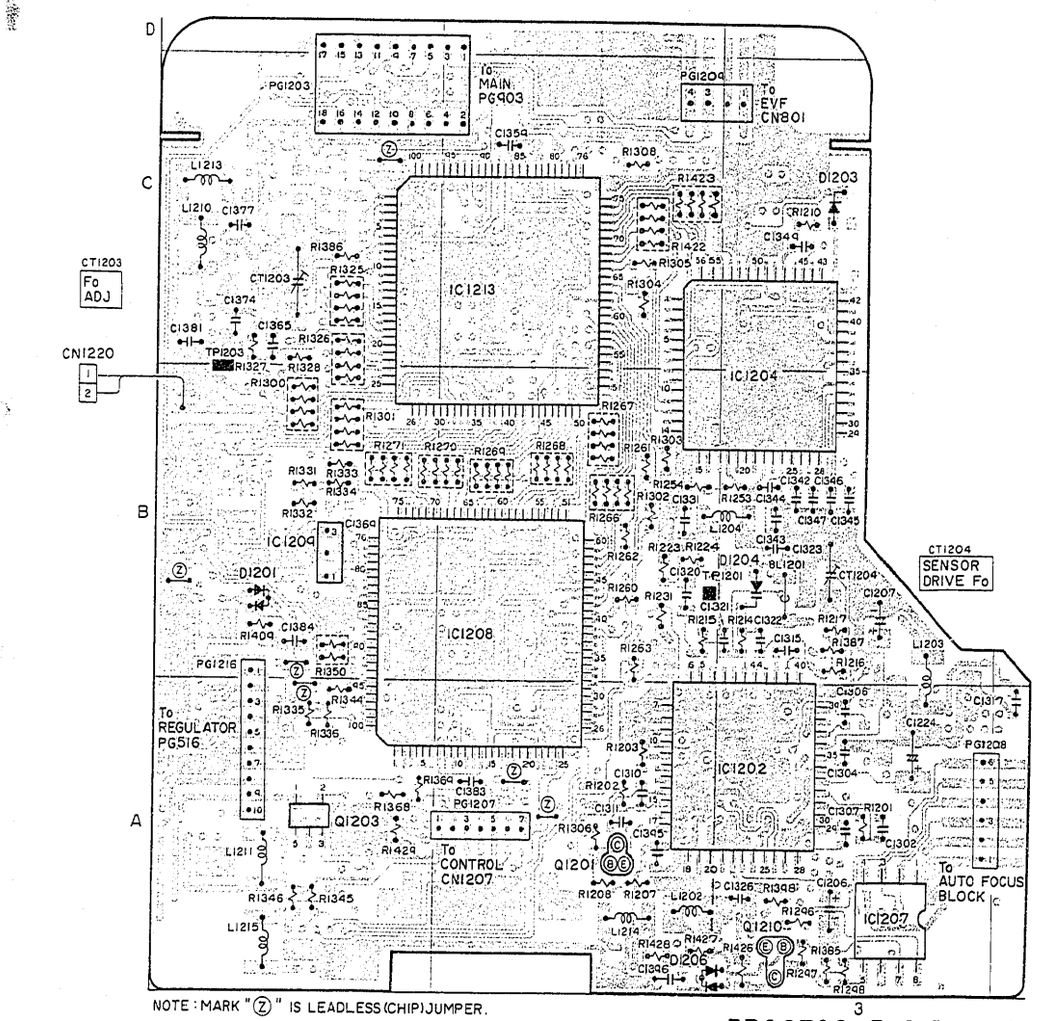
NOTE : MARK "Ⓩ" IS LEADLESS(CHIP)JUMPER.

PROCESS P.C.B
-SIDE A-
[PATTERN No. 154426-6]



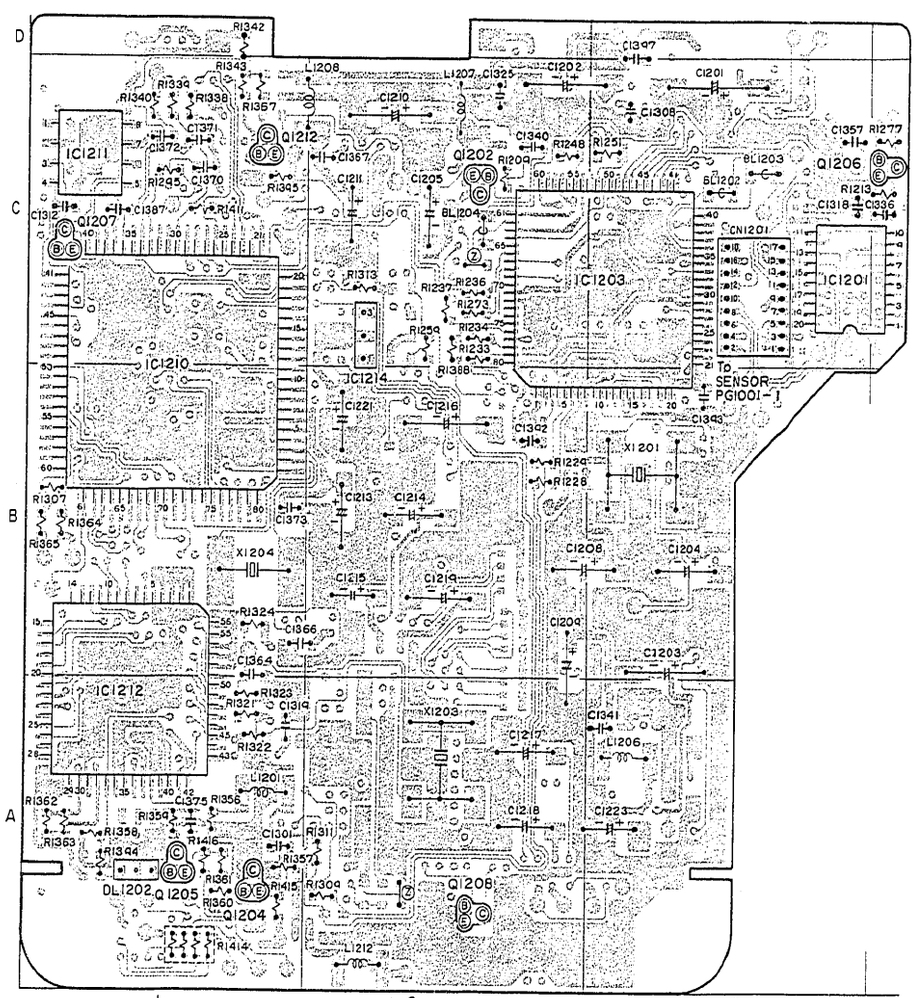
PROCESS P.C.B
-SIDE B-

PROCESS CIRCUIT BOARD DIAGRAM [PATTERN No. 154426-7]



NOTE : MARK "Ⓩ" IS LEADLESS (CHIP) JUMPER.

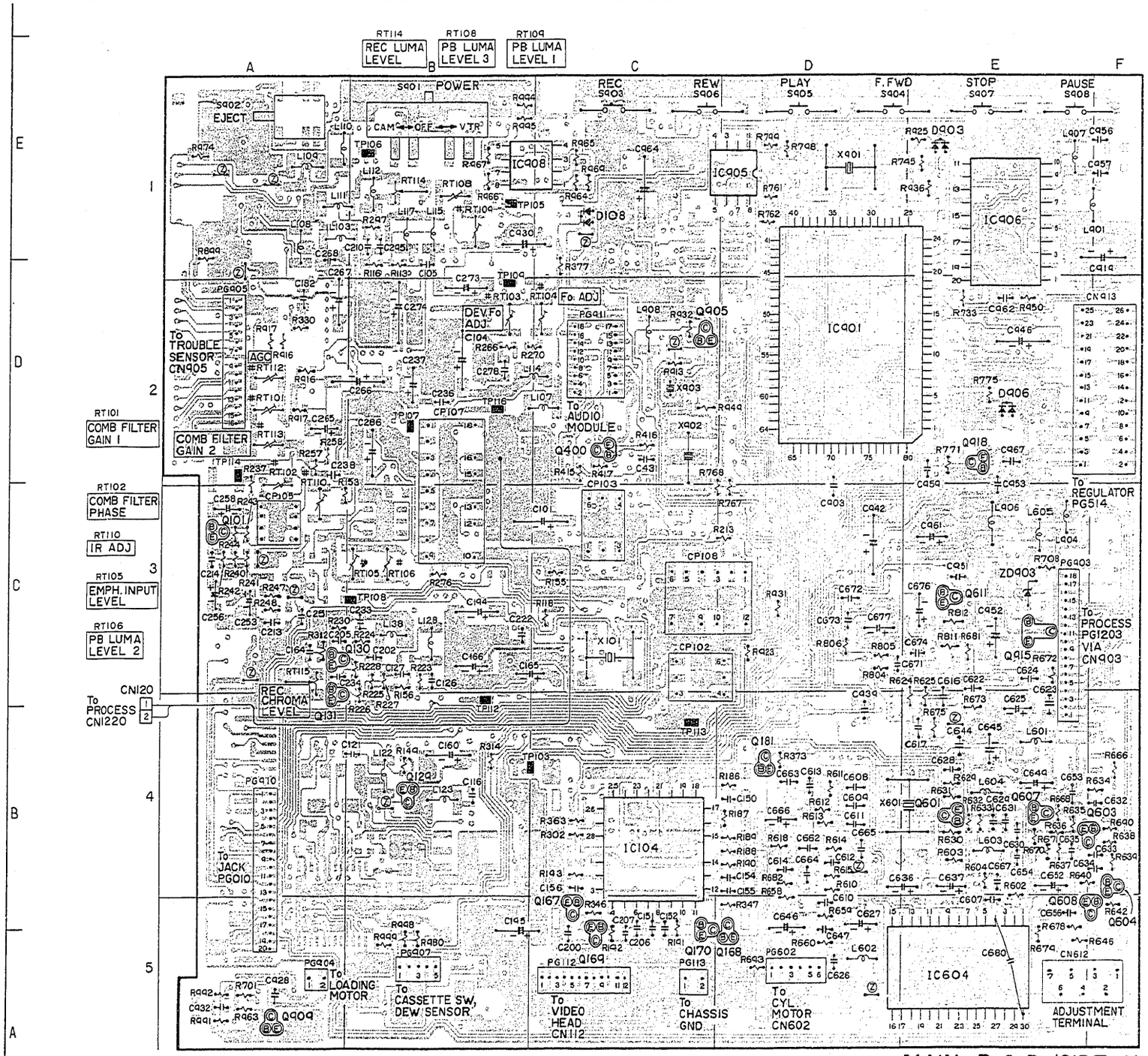
PROCESS P.C.B
-SIDE A-
[PATTERN No. 154426-7,8]



PROCESS P.C.B
-SIDE B-

PROCESS 5-16 5-17 PROCESS

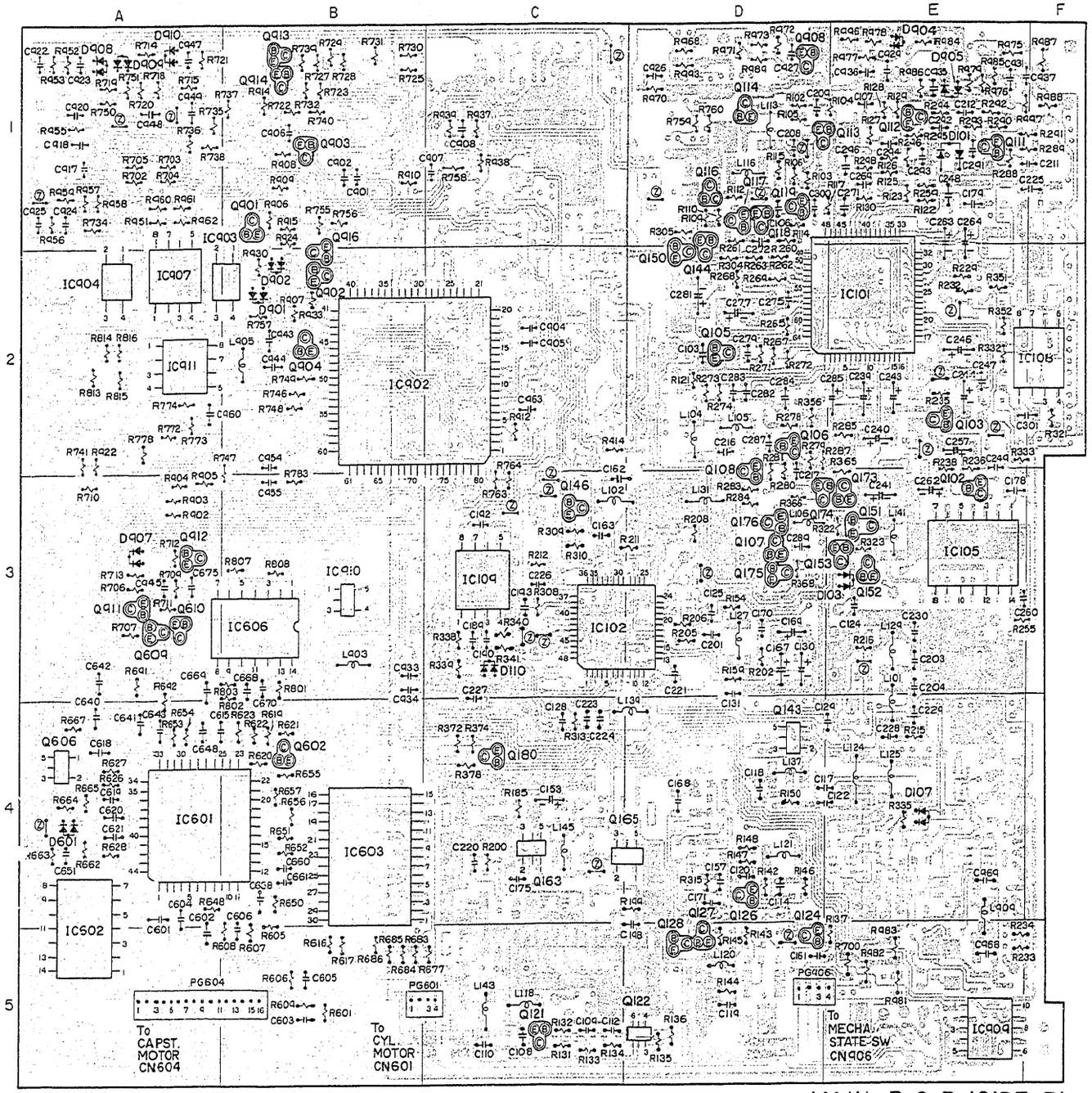
MAIN CIRCUIT BOARD DIAGRAM (SIDE-A) [PATTERN No. 154428-7]



NOTE : MARK "Ⓩ" IS LEADLESS (CHIP) JUMPER.
: SOLDER SEMI-VARIABLE RESISTORS TO THE COMPONENTS MARKED # WHEN ADJUSTING THEM.

MAIN P.C.B (SIDE A)
[PATTERN No. 154428-7]

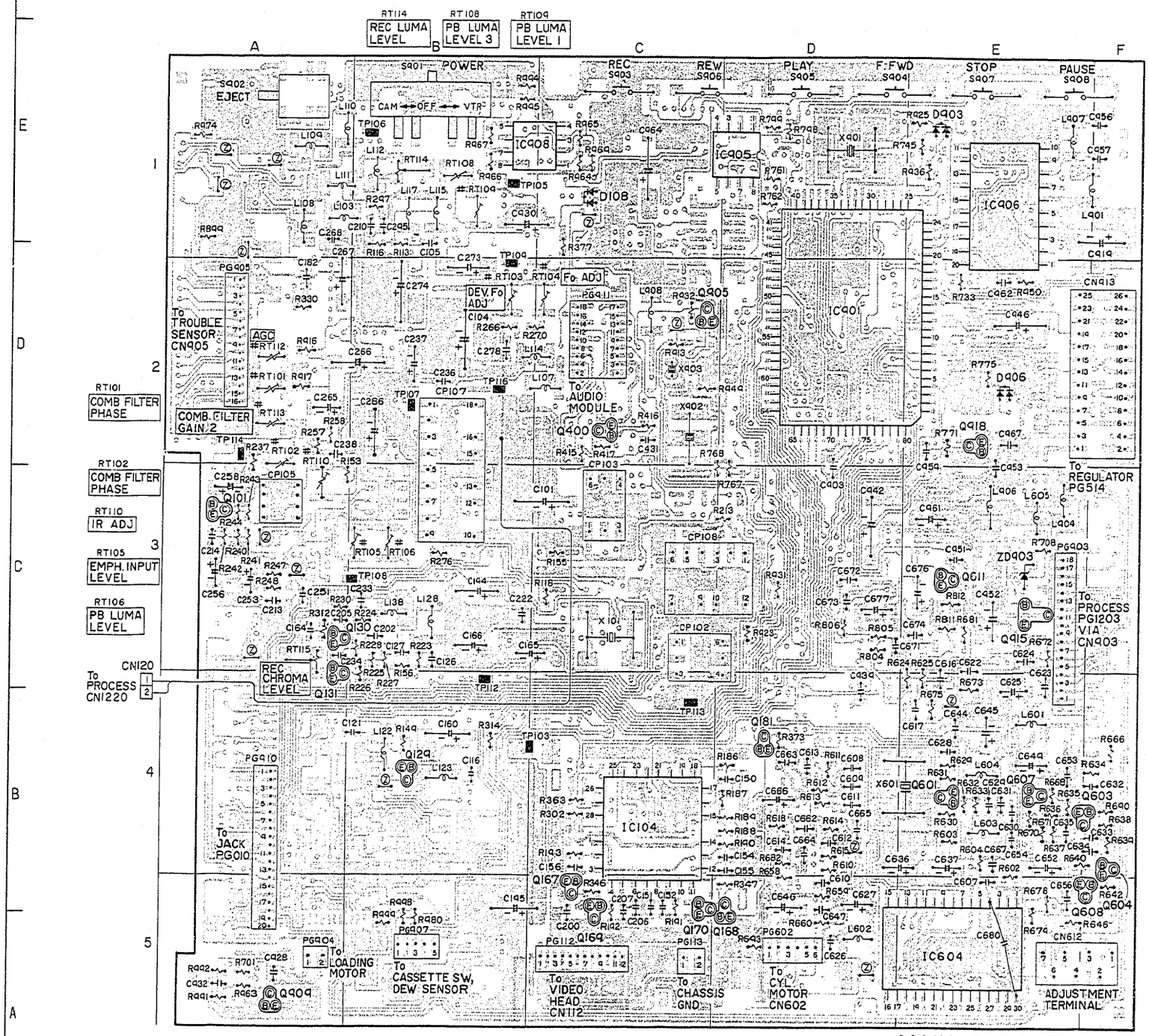
MAIN CIRCUIT BOARD DIAGRAM (SIDE-B) [PATTERN No. 154428-7]



NOTE : MARK "Ⓩ" IS LEADLESS (CHIP) JUMPER.

MAIN P.C.B (SIDE B)
[PATTERN No. 154428-7]

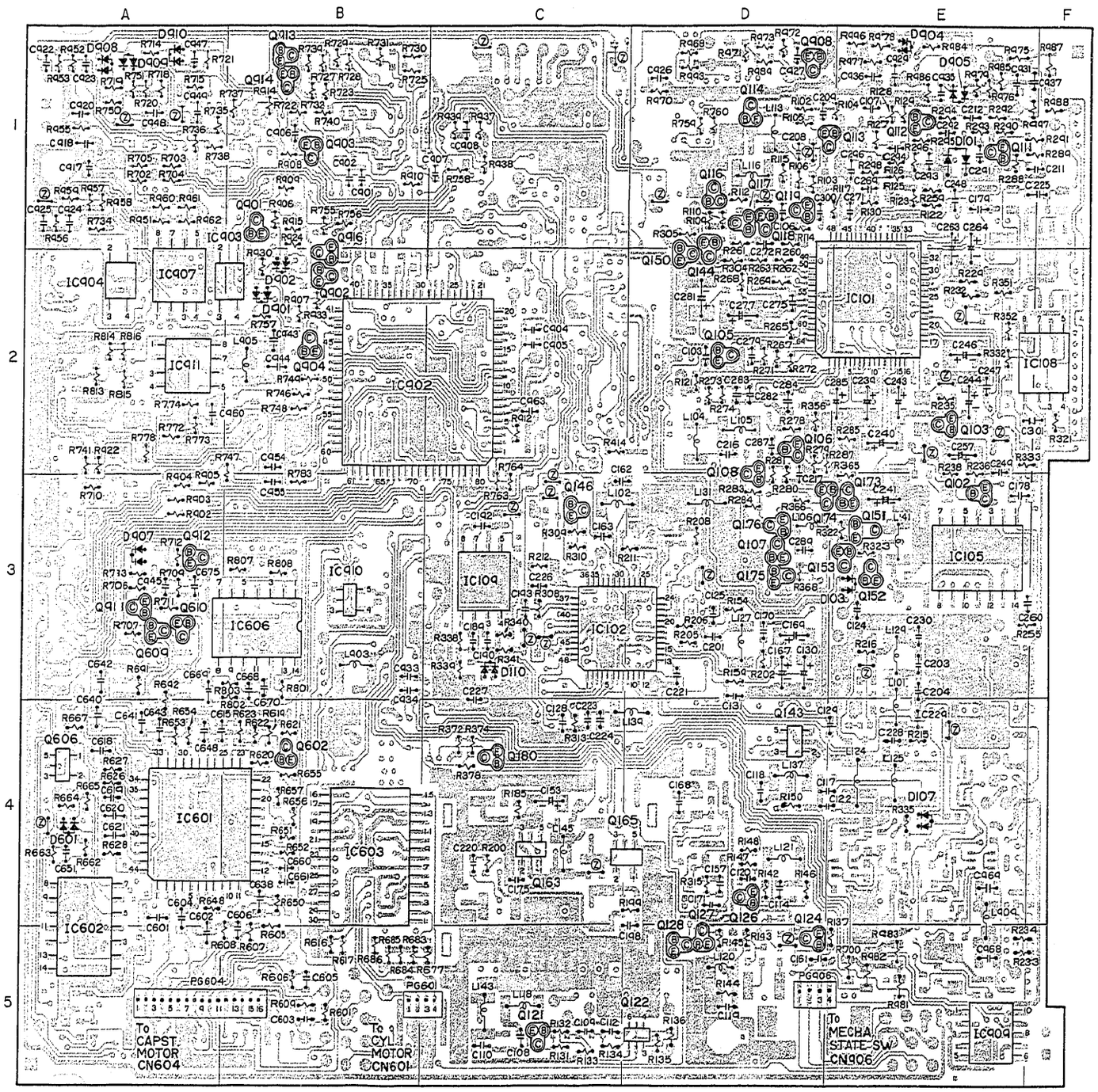
MAIN CIRCUIT BOARD DIAGRAM (SIDE-A) [PATTERN No. 154428-8]



NOTE : MARK "Ⓩ" IS LEADLESS (CHIP) JUMPER.
: SOLDER SEMI-VARIABLE RESISTORS TO THE COMPONENTS MARKED # WHEN ADJUSTING THEM.

MAIN P.C.B (SIDE A)
(PATTERN No. 154428-8)

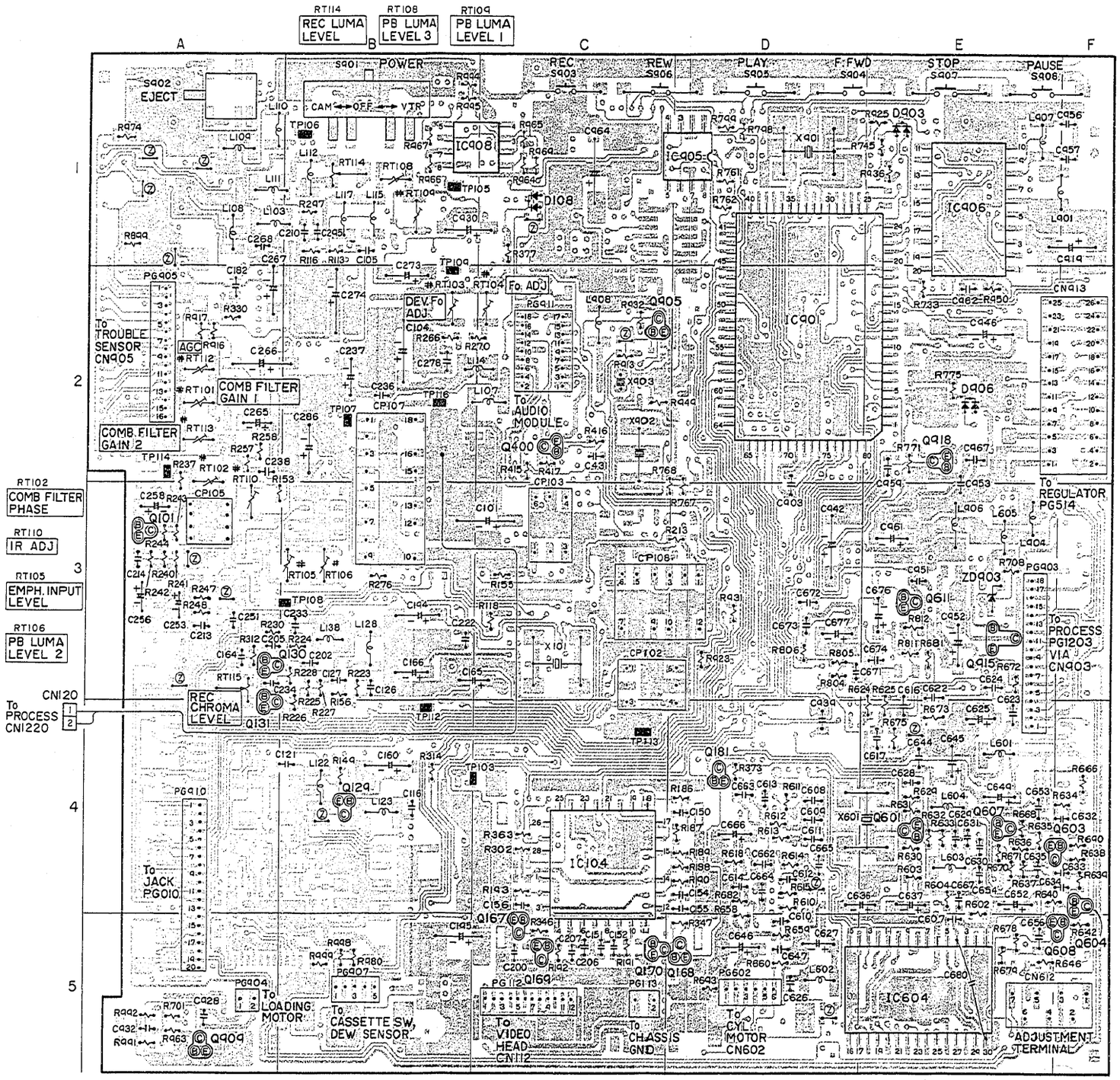
MAIN CIRCUIT BOARD DIAGRAM (SIDE-B) [PATTERN No. 154428-8]



NOTE : MARK "Ⓩ" IS LEADLESS (CHIP) JUMPER.

MAIN P.C.B (SIDE B)
[PATTERN No. 154428-8]

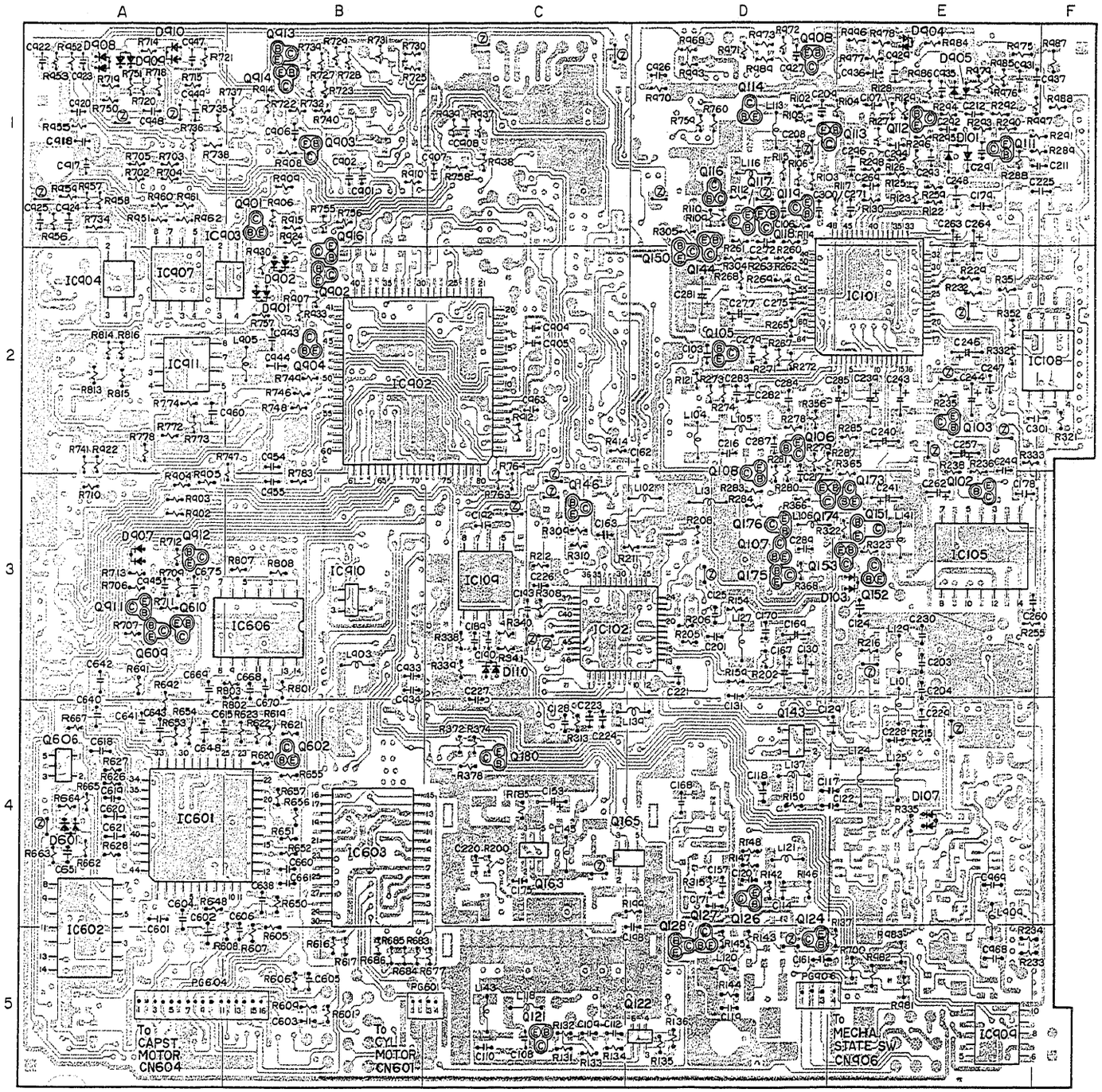
MAIN CIRCUIT BOARD DIAGRAM (SIDE-A) [PATTERN No. 154428-9]



NOTE: MARK "Ⓩ" IS LEADLESS (CHIP) JUMPER.
: SOLDER SEMI-VARIABLE RESISTORS TO THE COMPONENTS MARKED # WHEN ADJUSTING THEM.

MAIN P.C.B (SIDE A) [PATTERN No. 154428-9]

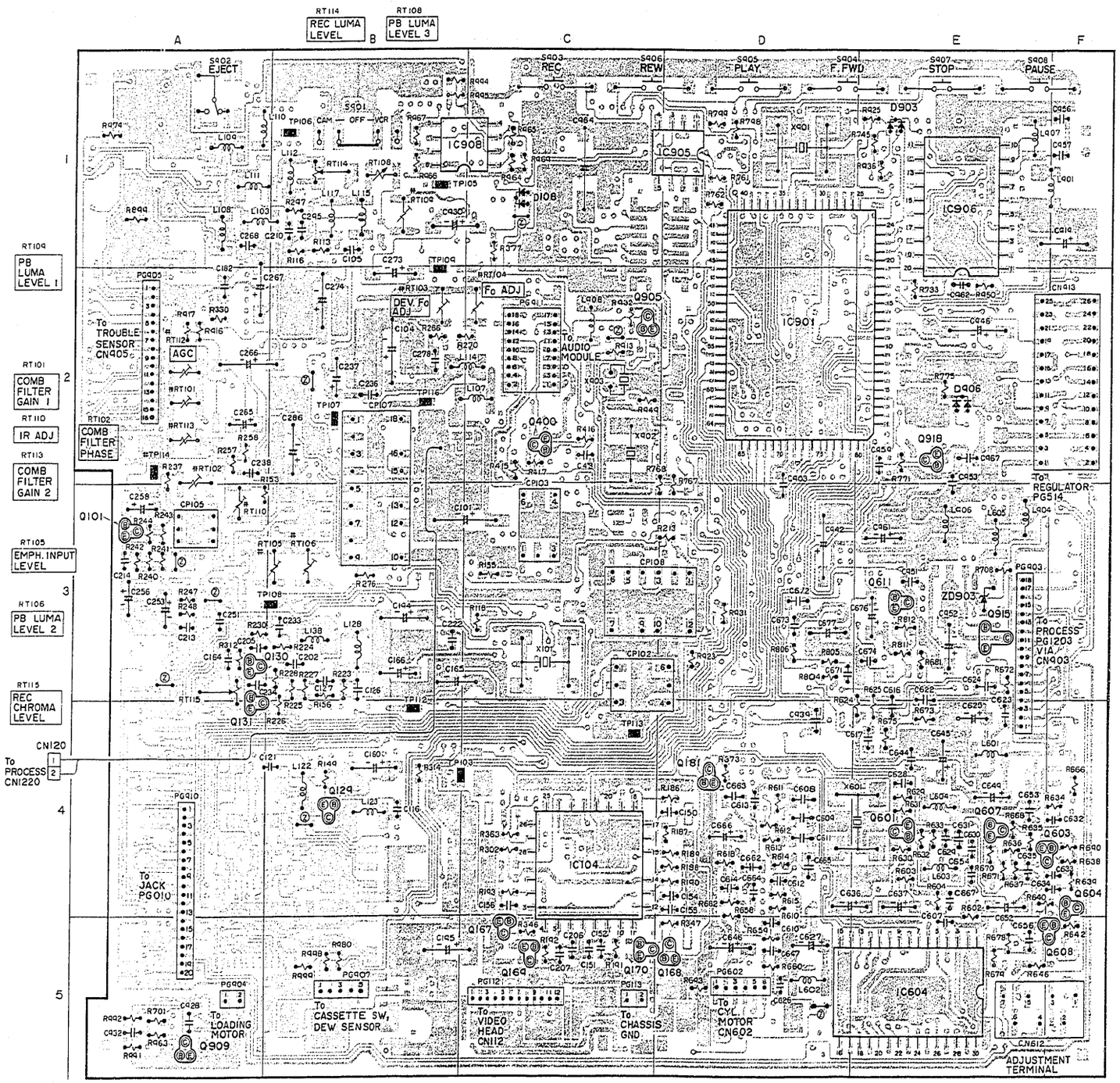
MAIN CIRCUIT BOARD DIAGRAM (SIDE-B) [PATTERN No. 154428-9]



NOTE : MARK "Ⓩ" IS LEADLESS (CHIP) JUMPER.

MAIN P.C.B (SIDE B)
[PATTERN No. 154428-9]

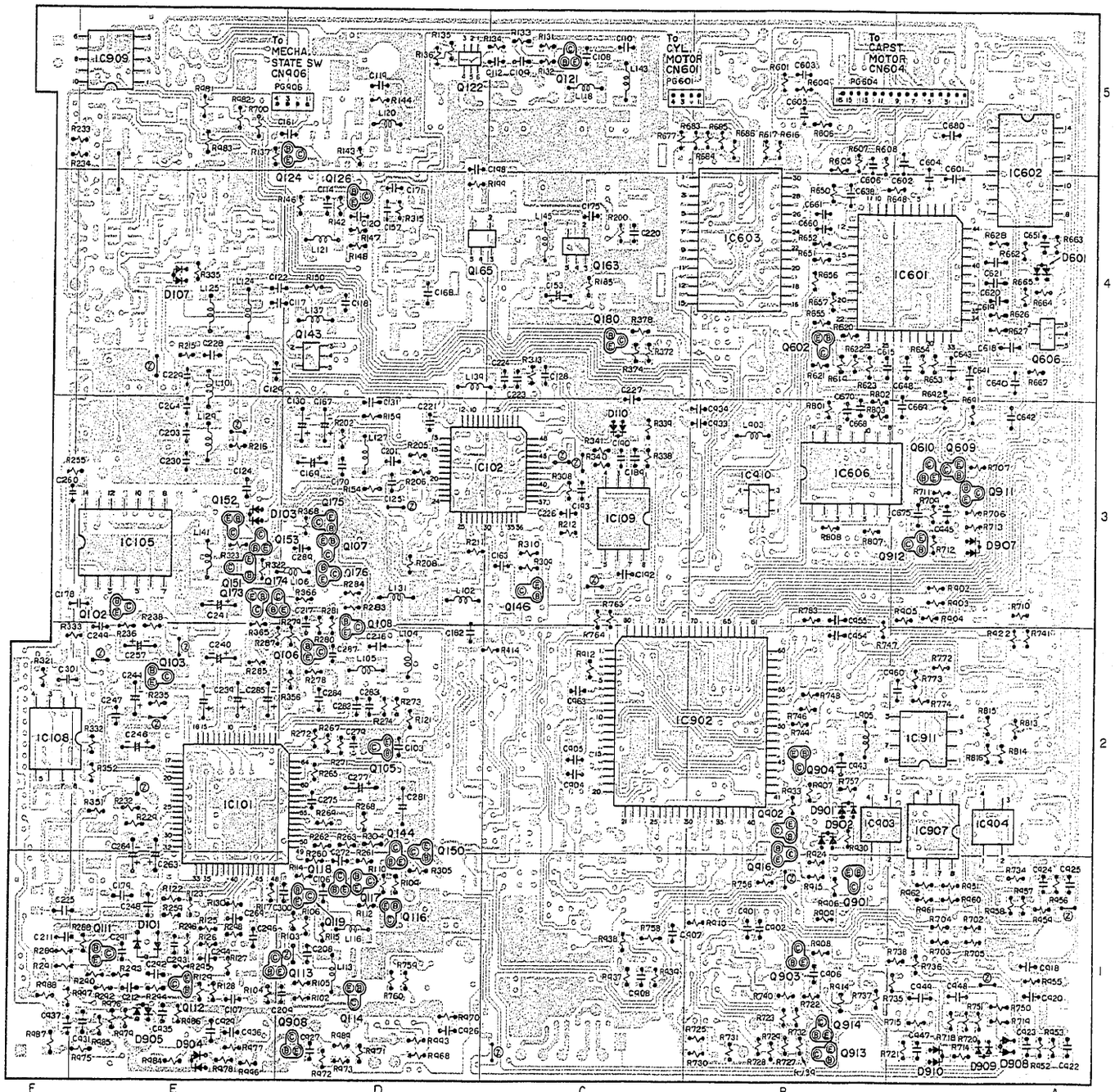
MAIN CIRCUIT BOARD DIAGRAM (SIDE-A) [PATTERN No. 154429-1]



NOTE : MARK "②" IS LEADLESS (CHIP) JUMPER.
: SOLDER SEMI-VARIABLE RESISTORS TO THE COMPONENTS MARKED ## WHEN ADJUSTING THEM.

MAIN P.C.B (SIDE-A)
[PATTERN No. 154429-1]

MAIN CIRCUIT BOARD DIAGRAM (SIDE-B) [PATTERN No. 154429-1]

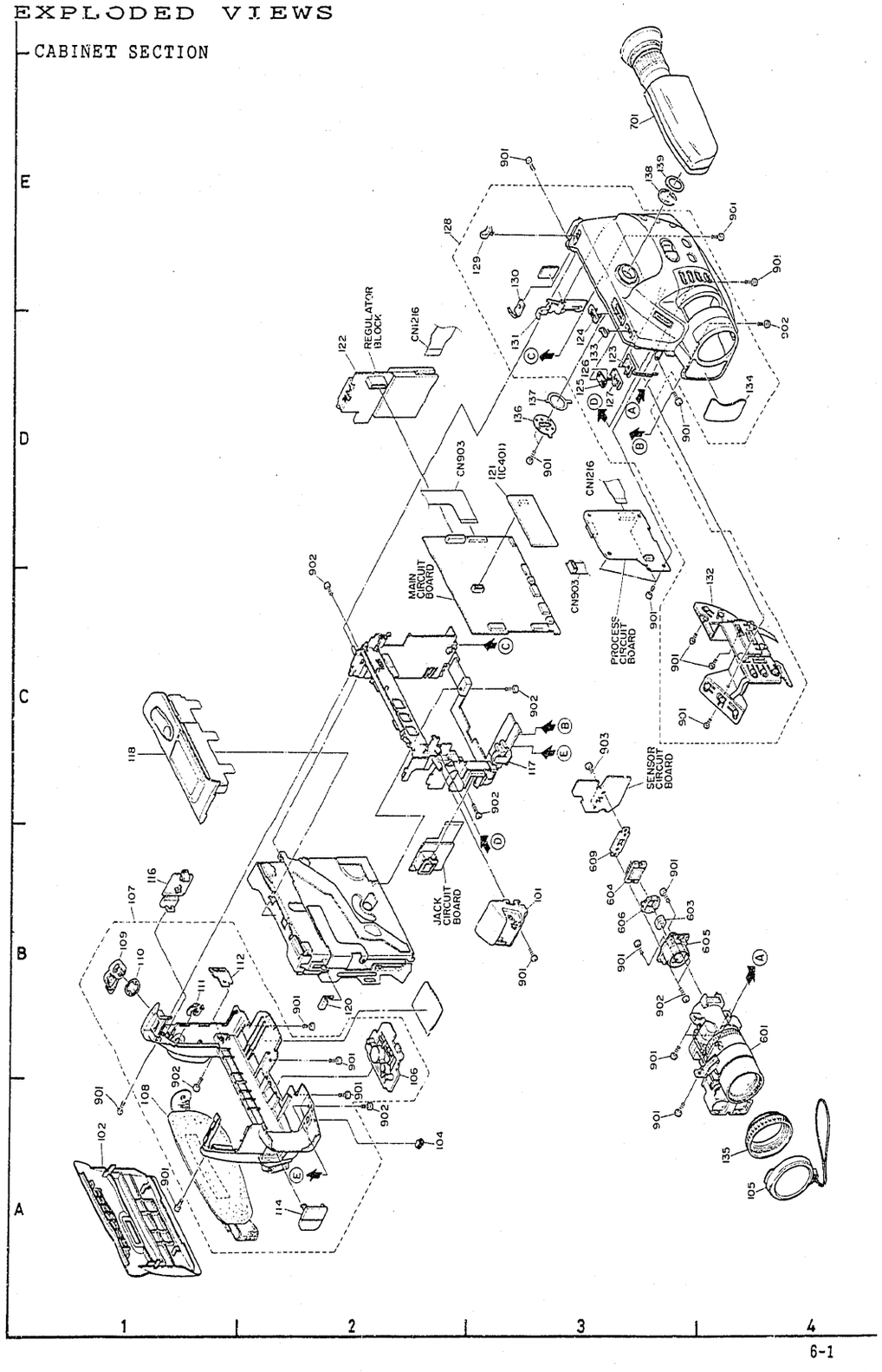


NOTE: MARK "②" IS LEADLESS (CHIP) JUMPER.

MAIN P.C.B (SIDE-B)
[PATTERN No. 154429-1]

CHAPTER 6
EXPLODED VIEWS

CABINET SECTION



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